

MODERN Machine Shop

October, 1939

7TH FLOOR

Rx PRESCRIPTION FOR
MODERNIZING
and SIMPLIFYING



"NORMA-HOFFMANN"
PRECISION BALL BEARING

Write for the Catalog, giving complete details.

- Diagnosing current design trends, the NORMA-HOFFMANN "CARTRIDGE" BEARING is prescribed:
 - TO SIMPLIFY DESIGN by eliminating supplementary outside closure parts and protective seals.
 - TO LOWER MANUFACTURING COSTS by cutting out many costly machining operations.
 - TO SPEED UP PRODUCTION, since the "CARTRIDGE" Bearing is handled as an integrally sealed unit, obviating extra parts, with easier and faster assembly.
 - TO ELIMINATE THE DIRT HAZARD, its truly effective seals providing absolute cleanliness before mounting or later upon removal of bearing.
 - FOR LONGER LIFE AND LOWER MAINTENANCE resulting from its large, lasting grease capacity and positive sealing in any position against leakage of lubricant and ingress of foreign matter.
 - FOR EASY REGREASING AND INSPECTION, refilling plug and removable seals being provided for such purposes.

"CARTRIDGE" BEARING

NORMA-HOFFMANN BEARINGS CORPORATION, STAMFORD, CONN., U. S. A.

"LOGAN"



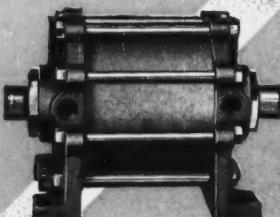
Air Control Valves



Rotating Cylinders



American Standard Chucks



Non-Rotating Cylinders

STANDARD AIR EQUIPMENT... ADAPTABLE TO THOUSANDS OF APPLICATIONS

The "Logan Line" of Standard Air Equipment is designed to eliminate wasted time, effort and motion. The line is complete and includes Air Control Valves, Rotating and Non-Rotating types of Air Cylinders, Air Operated Chucks, Relief and Reducing Valves, Presses, Vises and other miscellaneous devices.

"Logan" Air Equipment is so designed that it is easily adaptable to all types of production machines to meet every requirement. Thousands of uses have been found for this equipment in the plants of the leading metal working industries of the world.

"Logan" Field Representatives and "Logan" Engineers will be glad to make recommendations on your own requirements. Catalog and complete information will be mailed on request.

LOGANSPORT MACHINE INCORPORATED

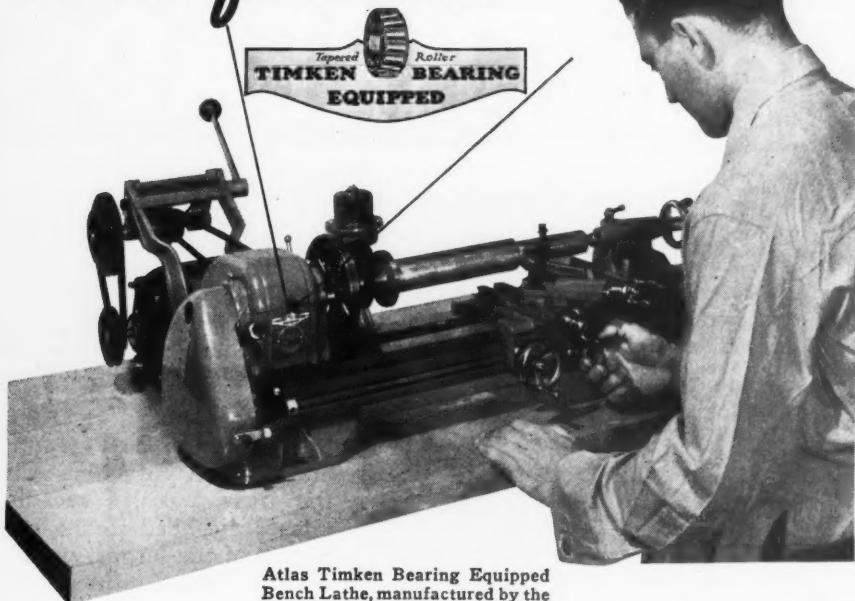
901-Payson Road Logansport, Indiana

Manufacturers of Air and Hydraulic Devices,
Chucks, Cylinders, Valves, Presses
and Accessories



ABOUT TO BUY A BENCH LATHE?

look for this -



Atlas Timken Bearing Equipped
Bench Lathe, manufactured by the
Atlas Press Co., Kalamazoo, Mich.

On the headstock of many leading bench lathes you will find the "Timken Bearing Equipped" symbol.

The full significance of this symbol will be revealed to you only after years of service. Why? Because TIMKEN Bearings keep bench lathe spindles accurate and in constant alignment. Look for "Timken Bearing Equipped" when buying.

THE TIMKEN ROLLER BEARING
COMPANY, CANTON, OHIO

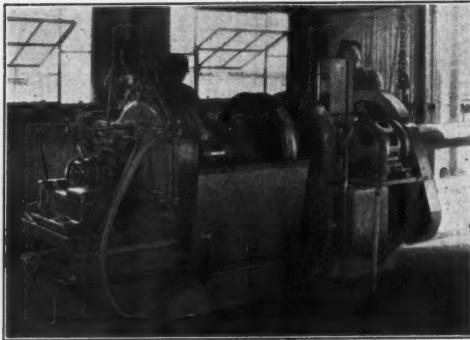
TIMKEN
TAPERED ROLLER BEARINGS

FOR THE ULTIMATE IN MODERNIZATION

LANDISIZE your THREADS

Almost Every Industry Obtains
Thread Accuracy with LANDIS

The threading of drill pipe, casing, and tubing, used in oil wells from one to two miles deep, is a precision job. This work is made more difficult by the fact that the material, .40 to .50 carbon seamless, has a high tensile strength.



Here is shown an $8\frac{5}{8}$ " LANDIS Pipe Threading and Cutting Machine with the new Landis receding chaser die head in the shop of one of the largest producers in the Mid-Continent field.

This machine regularly produces a $6\frac{5}{8}$ " O. D., 8 pitch, $\frac{3}{4}$ " taper thread, $3\frac{7}{8}$ " long to limits of plus or minus .001"

in lead, and plus .0026", minus .0013" in taper—closer limits than required by A. P. I. specifications.

Investigate LANDIS Thread Cutting Equipment for
handling your threading operations.

LANDISIZE your THREADS

LANDIS MACHINE CO., Inc.
WAYNESBORO · PENNA.

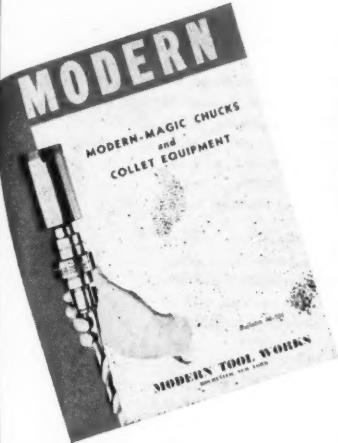


TAP! TAP! TAP!

the BOYS are CALLING

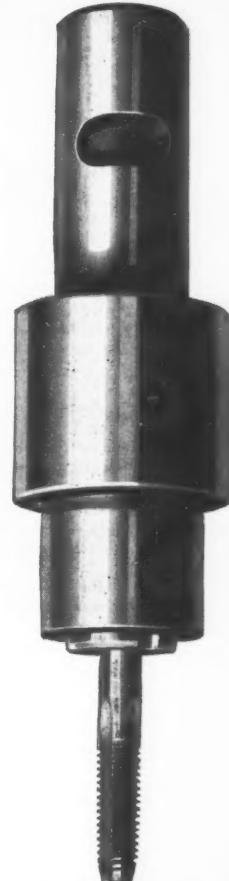


You can stop that endless march to the tool crib to replace broken taps by using the MODERN Friction Tap Collet in connection with your MODERN-MAGIC Chuck. Not only does this MODERN Friction Tap Collet cut down on tap breakage, particularly in tapping to bottom, but it saves time in tool changing and also lowers that spoiled work pile.



Try this Friction Tap Collet on your tapping jobs and see how you get better work at lower cost. If you like, we can supply MODERN Friction Tap Collets with straight or other shanks for direct application to turret lathes or other machines.

Bulletin M-101 gives you more information about MODERN Friction Tap Collets as well as the other types of MODERN-MAGIC Collets. Send for your copy.



MODERN TOOL WORKS

ROCHESTER

•

NEW YORK

How FAST Could You DOUBLE or TRIPLE Your Production . . .



Are you prepared for an unusual demand your plant may be called upon to meet? If the time comes when your production must be multiplied to an unprecedented extent and with all possible speed, what will be your answer?

Under such conditions, the normal increase you can obtain from extra man-power and extra hours of work may be inadequate. The real solution then lies in increasing productive facilities, making machines do more work in a given time, producing in one hour that which formerly required two—and doing this without sacrificing essential quality.

The plants in which management is today laying the groundwork for the procedure and equipment necessary to provide for tomorrow's production requirements, are the plants that will meet this demand quickly and efficiently. Costly confusion and delay may be the penalty of procrastination; orderly production and sound profits the reward of preparedness.

*and how much
would it cost?*

For plants whose production involves machining operations, Carboloy cemented carbide is of exceptional importance in such a program. The ability of this material to increase production through higher cutting speeds (or feeds), and less downtime for tool changes, is an accepted fact established over a period of 10 years. As such, Carboloy tools are an invaluable factor not only in stepping up the productive capacity of existing equipment but also in obtaining maximum performance from new machine tools.

Past experience has shown that in each plant a period of adjustment is usually necessary in order to obtain the full benefits of Carboloy tool use. This is particularly true in cutting of steel with cemented carbides.

Our organization today has the manpower and time to assist you in establishing the best practice for cemented carbide use in your plant. Call upon us today to help your plant prepare to meet tomorrow's demand . . . with Carboloy tools.

CARBOLOY COMPANY, INC., DETROIT, MICHIGAN

CHICAGO • CLEVELAND • NEWARK • PITTSBURGH • PHILADELPHIA • WORCESTER, MASS.

Canadian Distributor: Canadian General Electric Co., Ltd., Toronto

Titanium Carbide

•

Tantalum Carbide

•

Tungsten Carbide

CARBOLOY CEMENTED CARBIDE TOOLS

MODERN Machine Shop

HOWARD CAMPBELL, Editor

Volume 12

OCTOBER, 1939

Number 5

Published monthly by
Gardner Publications, Inc.
431 Main St.,
Cincinnati, Ohio

DON G. GARDNER
President and
General Manager

JOHN M. KRINGS
Advertising Manager

GEORGE E. HAY
431 Main St., Cincinnati
Main 0182

G. M. FILLMORE
342 Madison Ave.,
New York
Murray Hill 6-8899

Tribune Tower, Chicago
Superior 2290
Copyrighted

Member



Copyrighted

CONTENTS

Practical Heat Treating, II.....	43
By FREDERICK T. POTTER	
New Machines for Molding Plastics.....	58
By BARTLETT WEST	
What About Business in Argentina?.....	72
By DR. WALTER P. SCHUCK	
Modern Mercury Lights Aid Manufacture of Tube Cleaning Equipment	86
By PAUL T. KEEBLER	
21st Annual National Metal Congress and Exposition.....	94
IDEAS FROM READERS	
—Adjustable Plug Gage for Reducing Plug Gage Investments	96
By JOHN A. HONEGGER	
—Bending Tubing Without Causing Wrinkles.....	98
By PETER L. BUDWITZ	
—Inserted-Tooth Face Mill	98
By L. KASPER	
—Adapting Old Foundations to Old Equipment.....	104
By ELTON STERRETT	
—Grinding Fixture for Screw Driver Blades.....	108
By J. R. WHITTLES	
Over the Editor's Desk.....	112
New Shop Equipment.....	114
Catalog Library	192
Services Directory	194
"There's One in Every Shop".....	196
By WESSER	
Index to Advertisements.....	198

(Entered as third-class matter at Cincinnati, O., under Section 574½ P.L.&R., Act of June 5, 1934)

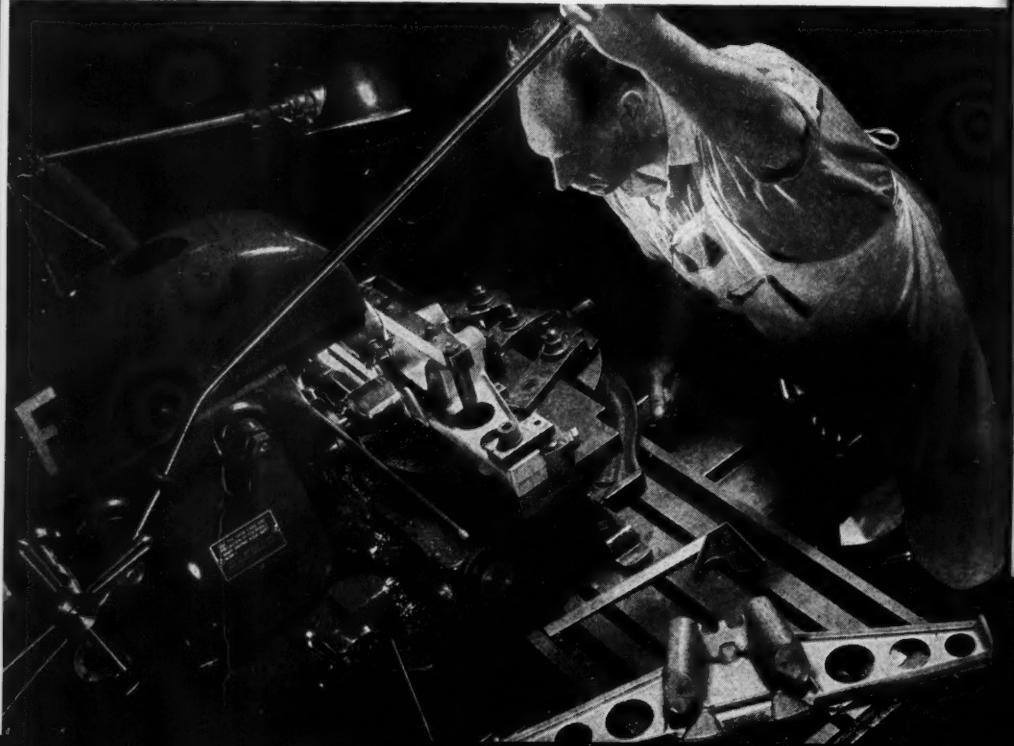
Circulation This Issue More Than 29,000

IT'S ALWAYS HIGH

● Here's a No. 3 Plain Dial Type Miller face milling the ends and sides of an airplane truss—upper station. This job can be handled from the front, but the operator can see what he's doing better if he stands at the rear. And that's where the CINCINNATI Dial Type Milling Machine stands out—for the Dial Type has a complete set of control levers at both front and rear operating positions

When you can always "see the job" you turn out better work, faster. Do it on a CINCINNATI Dial Type Milling Machine.

SAVE WITH A NEW CINCINNATI



VISIBILITY

Check These Features

MACHINE—CINCINNATI
No. 3 Plain Dial Type
Milling Machine.

PART—Truss, upper station

MATERIAL—Aluminum

OPERATION—Face mill ends
and sides simultaneously

STOCK REMOVAL— $\frac{1}{4}$ ", part is
25' long

LIMITS—.002"

FEED— $2\frac{1}{8}$ "

CUTTER R. P. M.—187

CUTTERS—End Mill, $2\frac{3}{4}$ "

CUTS—One

- Front and rear control of feeds and speeds by power
- Hand adjustments, cross and vertically
- Power feed with independent directional control levers, cross, vertically and longitudinally
- Power quick traverse in six directions, cross, vertically and longitudinally, with spindle stationary or running
- All these selected by *dual control* from front and rear.
- Write today for the folder "Save 15% to 40%."



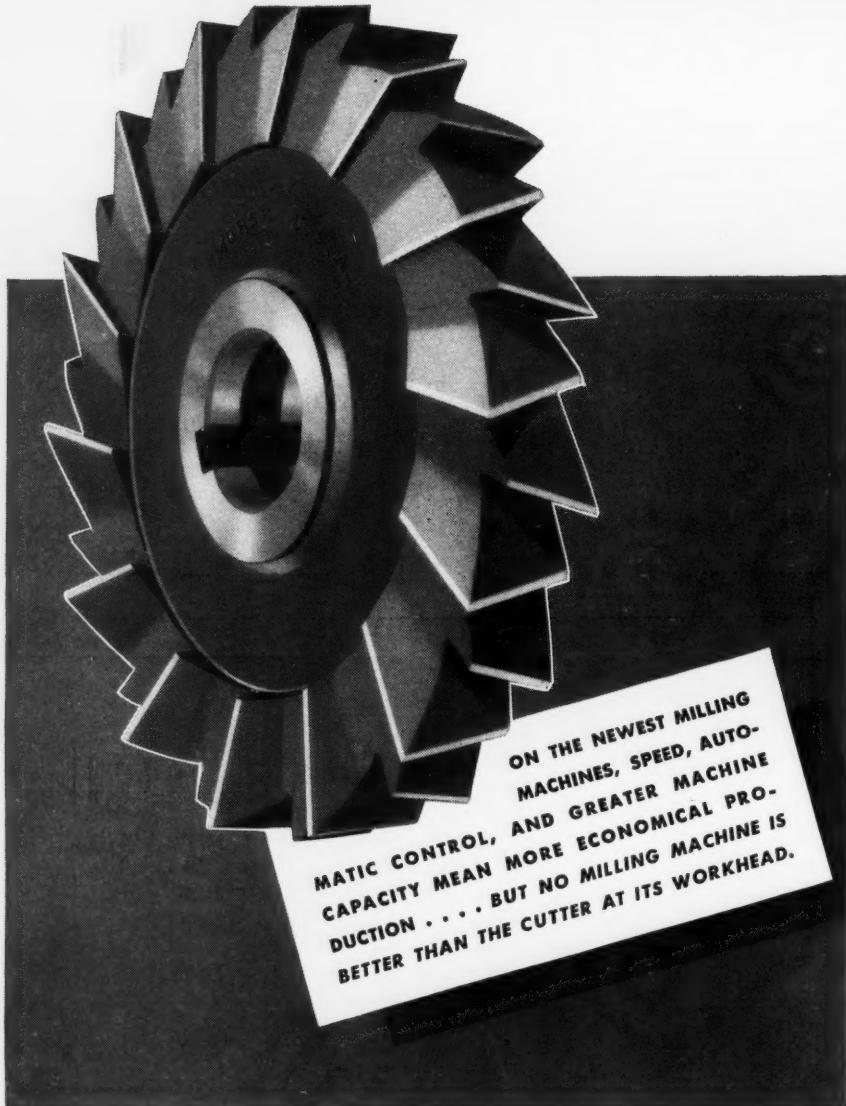
A SYMBOL OF A DEFINITE STANDARD OF WORTH

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI GRINDERS INCORPORATED

Manufacturers of

Tool Room and Manufacturing Milling Machines

Surface Broaching Machines Centertype Grinding Machines Cutter Sharpening Machines
Centerless Grinding Machines Centerless Lapping Machines



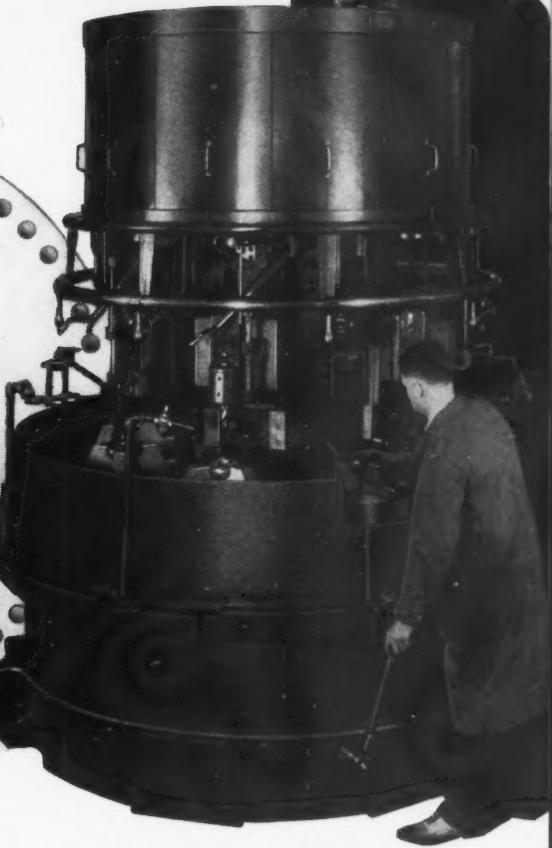
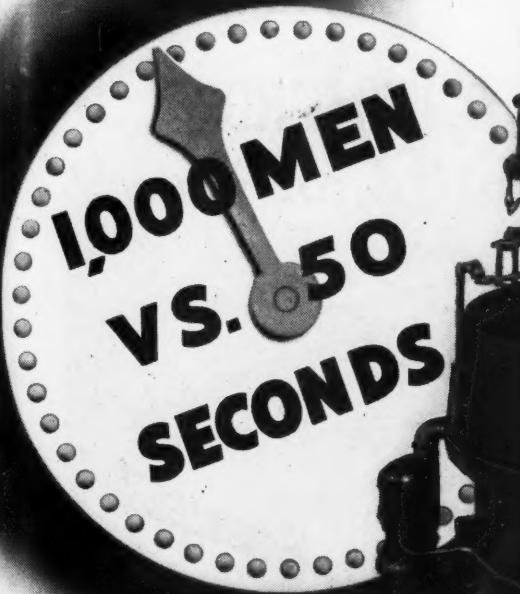
ON THE NEWEST MILLING
MACHINES, SPEED, AUTO-
MATIC CONTROL, AND GREATER MACHINE
CAPACITY MEAN MORE ECONOMICAL PRO-
DUCTION . . . BUT NO MILLING MACHINE IS
BETTER THAN THE CUTTER AT ITS WORKHEAD.

MORSE

THERE IS A
DIFFERENCE

**TWIST DRILL AND
MACHINE COMPANY**
NEW BEDFORD, MASS., U. S. A.

NEW YORK STORE: 130 LAFAYETTE ST. -- CHICAGO STORE: 570 WEST RANDOLPH ST.



Over 1,000 men worked many days to build this Bullard Multi-Au-Matic—that you may save perhaps 50 seconds and a few cents.

But, even more important, those saved pennies and seconds represent increased sales, increased employment, increased profits *right in your own plant*, as Multi-Au-Matics play their part in helping you to build a better product for less money.

The wide scope of the Bullard Multi-Au-Matic is often not fully appreciated, even by those who own one. A wide range of sizes permits applying

the Multi-Au-Matic method to thousands of jobs even when the runs are as low as 250.

If you doubt the completeness of your information—send for a Bullard engineer.

BULLARD

THE BULLARD COMPANY
BRIDGEPORT, CONNECTICUT

MULT-AU-MATICS

See the Results
OF
"ENGINEERED LIGHTING"
in extra profits for you



Human eyes are the plant's most critical control devices. To keep eyes alert and quality high, the plant must not only have plenty of light, but must also have light "engineered" to eliminate glare and shadows. » » The higher light output of Cooper Hewitt Mercury Lamps is a vital link between good workmen and good work. The long-tube Cooper Hewitts virtually eliminate shadows and glare... detail-revealing mercury light makes seeing

easy, reducing "end-of-shift" fog. » » The services of the General Electric Company lighting engineers are at your disposal... to help you obtain extra profits from an "engineered" lighting system, selected to meet your requirements, from a complete line of industrial light sources. For full information write to the General Electric Company, Dept. 166-MM-J, Nela Park, Cleveland, Ohio.

GENERAL  **ELECTRIC**



No. 6 M Involute
Measuring Machine

Why
the Jobbing Shop
too, needs this
**NEW FELLOWS
MACHINE**

...to measure
INVOLUTE PROFILES

1. It checks the precision of the profile of spur and helical tooth gears.
2. It will determine the base radius of an involute of unknown diameter, when sample gears come in for duplication.

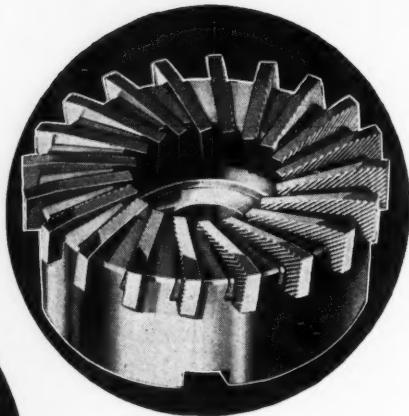
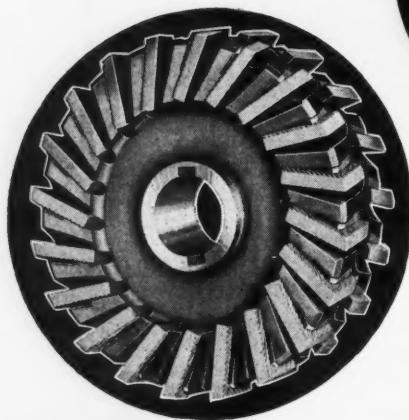
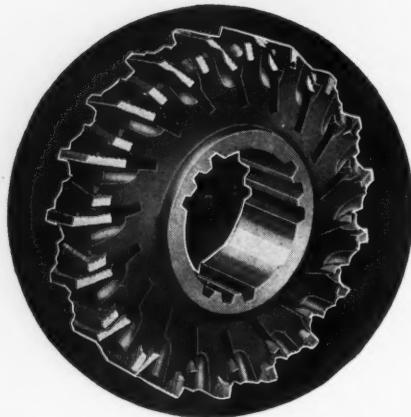
A N D . . . it does both jobs with an accuracy, a flexibility and an economy which are outstanding. NO BASE ROLLS TO CHANGE or to buy. This machine is set for any gear size with your standard size blocks.

INVESTIGATE . . . by writing for a copy of our new bulletin.

THE **FELLOWS** GEAR SHAPER
COMPANY

Springfield, Vermont or 814 Fisher Building, Detroit, Michigan

GAIRING LOCK



Fine Tooth Cutters

No inserted blade cutter involving the use of locks so closely approaches the rigidity of solid cutters as GAIR-LOCK. On any operation requiring close tooth spacing for intermittent cuts Gair-Lock should be used because of its great compressive strength and the ease and speed with which blades are withdrawn, replaced and adjusted. Furthermore, Gair-Locked blades triple blade life -- decrease blade cost.

Our engineering staff is at your disposal. May we assist you?

The Gairing Tool Co., Detroit, Michigan

In Canada, Hi-Speed Tools Ltd., Galt, Ont.

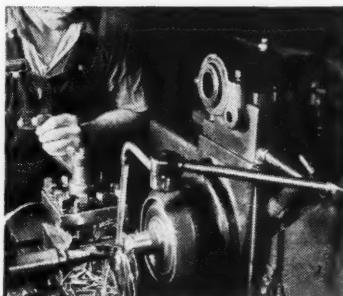
TOUGH STOCK MACHINED ACCURATELY AT HIGH SPEEDS...

READ THIS LETTER.

You, too, can get better results, using Texaco Transultex Cutting and Soluble Oils.

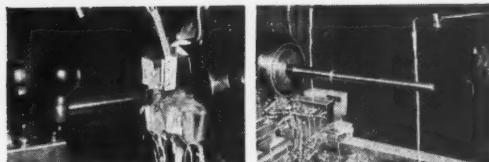
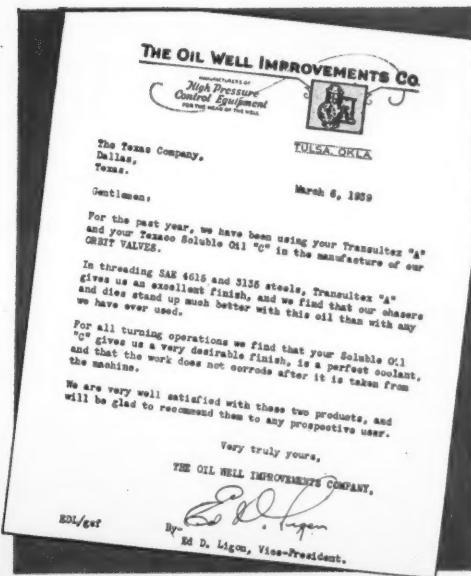
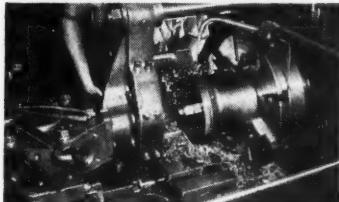
Experienced Lubrication Engineers, trained in the selection and application of Texaco Cutting and Soluble Oils, will be glad to demonstrate that savings can be made.

For prompt engineering service and deliveries, phone the nearest of our 2279 warehouses in the U. S., or write: The Texas Company, 135 East 42nd Street, New York City, N. Y.



DRILLING drop forgings in the plant of The Oil Well Improvements Co., Tulsa, Okla. They use Texaco Transultex Cutting Oil.

OIL WELL IMPROVEMENTS CO. reports that Texaco Transultex Cutting Oil adds to tool life.

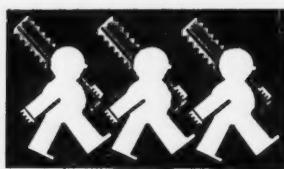


TEXACO SOLUBLE OIL at work in Oil Well Improvements shop. They report that work doesn't corrode when taken from machines.



TEXACO

CUTTING AND SOLUBLE OILS



Winter Quality

Means just one thing:

Taps bearing the name "WINTER" represent the finest threading tools skilled craftsmen can produce from special steels created especially to withstand severe strains.

A host of tap users who buy Winter Taps again and again on the strength of past performance, KNOW they are getting the lowest possible cost per tapped hole.

Winter Engineers see to it that if economies in production can be effected, the customer is first to be told.

WINTER BROTHERS COMPANY

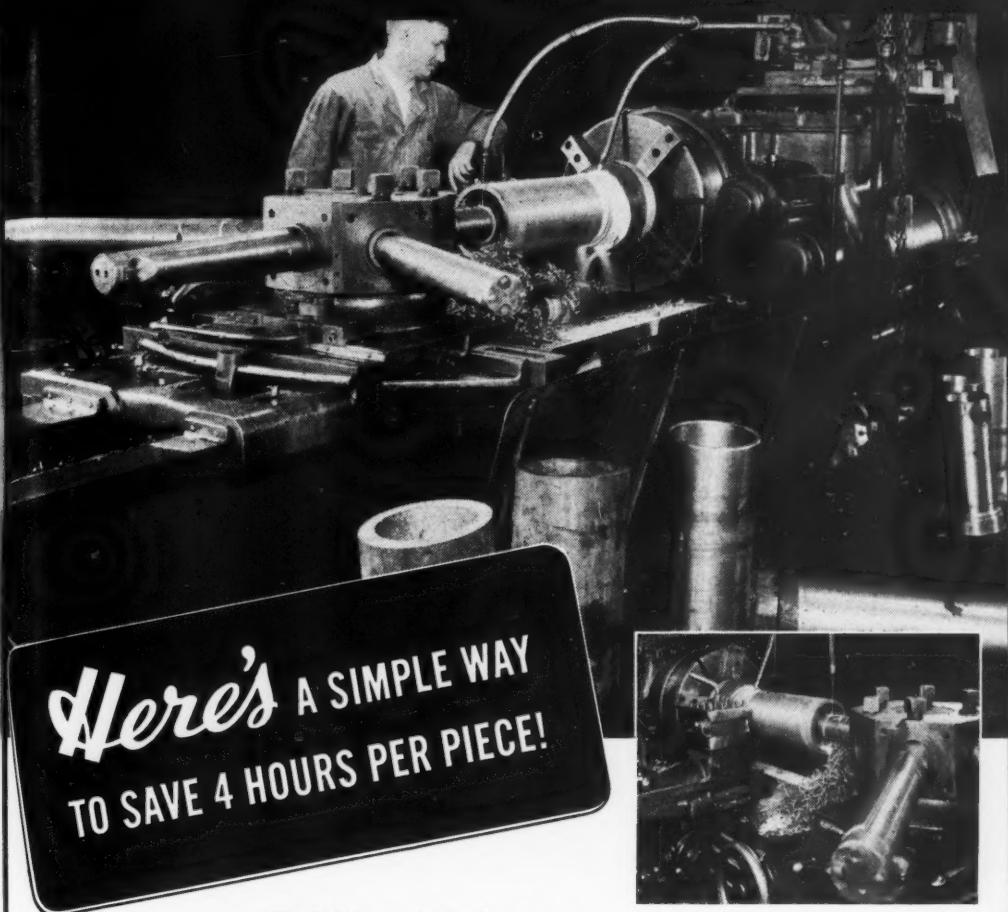
Main Factory: WRENTHAM, MASS.

Branch Factory: DETROIT, MICH.

WINTER TAPS AND DIES



Division of the
NATIONAL TWIST DRILL & TOOL CO
Detroit, Michigan



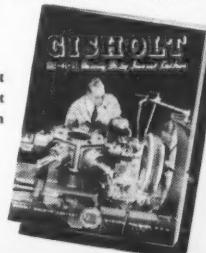
**Here's A SIMPLE WAY
TO SAVE 4 HOURS PER PIECE!**

The Gisholt cross feeding hexagon turret is used to excellent advantage in machining these large pump liners, which are $8\frac{1}{2}$ " in diameter by $31\frac{3}{4}$ " long. They are chucked in a Gisholt chuck and machined complete in one operation with Gisholt standard tools and boring bars. Turning and boring operations are carried on simultaneously in both roughing and finishing operations, which greatly reduces machining time. To bore the hole, it is only necessary to set the hexagon turret off center, and use single point boring bars. The material is SAE 4615 steel. From $\frac{1}{4}$ " to $\frac{1}{2}$ " of stock is removed from both the inside bore and the outside diameter, which is a lot of metal. Yet, this Gisholt 4L Heavy Duty Turret Lathe does it quickly and accurately—doing the job in 2 hours and saving 4 hours per piece.

"YOUR SMARTEST INVESTMENT TODAY—BETTER MACHINE TOOLS"

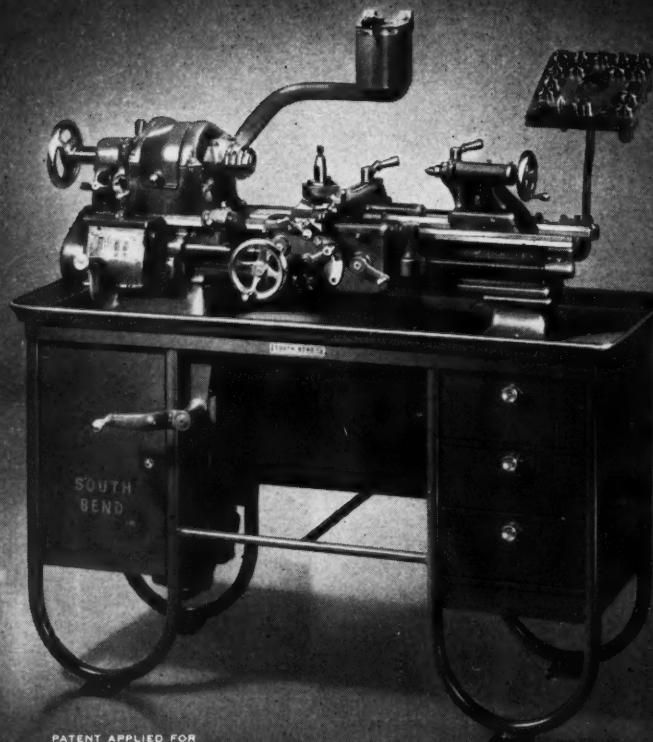
★ The Gisholt bed and headstock are cast in one piece. The beds are extra wide and have hardened steel ways. The Gisholt Cross Feeding turret is built with a dovetail guide and has a taper gib adjustment and a square lock gib at the extreme rear of the slide. These features provide the necessary rigidity and permit fast speeds with multiple cuts and maintain the machine's original accuracy.

Literature on Gisholt Heavy-Duty Turret Lathes is available on request.



G I S H O L T
MACHINE COMPANY

1219 EAST WASHINGTON AVENUE, MADISON, WISCONSIN, U. S. A.
TURRET LATHES • AUTOMATIC LATHES • TOOL GRINDERS • BALANCING MACHINES



PATENT APPLIED FOR

NEW SOUTH BEND 1" COLLET LATHE

-
- 9" SWING OVER BED
- 1 $\frac{3}{8}$ " SPINDLE HOLE
- 12 SPINDLE SPEEDS
- POWER CROSS FEED
- POWER LONG. FEED
- SCREW THREADS
- 4 TO 224 PER INCH

1" Collet Capacity 9-inch Swing South Bend Underneath Belt Motor Drive Quick Change Gear Tool Room Precision Lathe. Mounted on all steel welded bench. 4 H.P. instant reversing ball bearing motor and 12-speed drive are enclosed in left side of bench.

THIS new 1" collet capacity 9-inch swing back-gearied, screw-cutting lathe has the time saving features of an engine lathe combined with the sensitivity and accuracy of a fine precision collet lathe. It is capable of the most exacting tool and instrument work, and has the power and rigidity for taking heavy cuts on high speed production operations.

Tool Room Attachments as illustrated include hand wheel draw-in collet chuck attachment, telescopic taper attachment, micrometer carriage stop, thread dial indicator, and collet rack.

Manufacturing Attachments available include hand lever draw-in collet chuck attachment, semi-automatic hand lever bed turret, double tool rest, automatic carriage stop, four-way tool post turret, oil pump, piping.

Immediate Delivery can be made on all popular sizes of South Bend Lathes from dealer display stocks in principal cities; a few are listed below.

68 Sizes and Types of Lathes

9", 11", 13", 14 $\frac{1}{2}$ ", and 16" Swing.
3' to 12' Bed Lengths.
Countershaft Drive.
Motor Drive.



ON DISPLAY IN PRINCIPAL CITIES

Boston, Mass.—The MacKenzie Machinery Company
Buffalo, N. Y.—J. J. O'Connor Machinery & Tool Co.
Chicago, Illinois—C. E. Rausch Machinery Company
Cleveland, Ohio—Reynolds Machinery Company
Detroit, Michigan—Lee Machinery Company, Inc.
Los Angeles, Calif.—E. G. Davis Machinery Co.
Milwaukee, Wis.—W. W. Voelz Machinery Company
Newark, N. J.—J. R. Edwards Machinery Company
New York, N. Y.—A. C. Colby Machinery Company
Philadelphia, Pa.—F. J. P. Machinery Company
Providence, R. I.—Geo. T. Reynolds & Son, Inc.
San Francisco, Calif.—Moore Machinery Company
Seattle, Washington—Star Machinery Company

Send For
Illustrated
Catalog



SOUTH BEND LATHE WORKS

Lathe Builders Since 1906

978 E. Madison St., South Bend, Indiana, U.S.A.

DOES MORE JOBS A DAY- FOR MORE DAYS!

It's *portable*—easy to move from job to job. It's *fast*—smooth and vibrationless at each of its variable speeds. It's *versatile*—handles wheels up to 6 inch diameter and $\frac{3}{4}$ inch face for work on welds, castings, marble, concrete and fabricated metals. And it's *de-*

pendable—developed and manufactured by Haskins for long years of trouble-free service. If there's a bothersome grinding, polishing or wirebrushing problem in your plant, maybe H-6 is the answer. Why not find out?



EQUIPMENT FOR EVERY NEED
Direct and countershaft drives
—bench, truck and ceiling-sus-
pended mountings. The complete
line of Haskins Flexible Shaft
Equipment and many diverse applications
are illustrated in Booklet No. 44. Write
for it. R. G. Haskins Company, 619 S.
California Ave., Chicago.



HASKINS *Versatile* FLEXIBLE SHAFT EQUIPMENT

HASKINS FLEXIBLE SHAFT EQUIPMENT TYPE H-6

MOTOR—Full $\frac{1}{2}$ HP, ball bearing, repulsion induction, 1725 RPM.

SPEEDS—825, 1225,
2400, 3400 RPM
from 4 speed Timken bearing countershaft.

CORE— $\frac{1}{8}$ " diameter by approximately 6', heavy duty construction.

CASING—Improved, reinforced, rubber bound, with hardened alloy steel removable ends and ball bearing swivel end.

SPINDLE—Full ball bearing, accurately balanced, dust and grease sealed.

EUROPEAN REPRESENTATIVE—G. E. MARBAIX, LTD., HUMGLAS HOUSE, LONDON, S. W. 1.

ROTO-CLONE

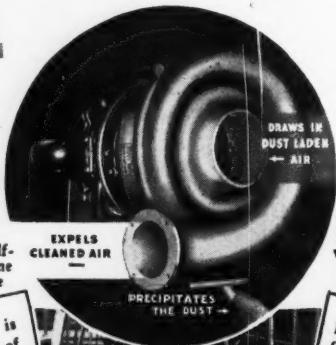
Process Dust Control Systems

SOLVE INDUSTRY'S NEEDS FOR

- Grinding
- Polishing
- Processing
- Cutting
- Crushing
- Conveying
- Broaching
- Pulverizing
- Mixing



Direct driven Self-Contained Roto-Clone collecting from a surface grinder.



Belt Driven Self-Contained Roto-Clone furnished complete with special hood and connection for cutter grinder exhaust.



The Type D Roto-Clone is available in a wide range of sizes for the dry collection of all types of granular process dust from a single machine to a multiple grinder set-up as illustrated below.

In addition to the Type D, other Roto-Clones are available. The Type W—which combines water spray with dynamic precipitation, is suitable for handling dusts inclined to cake or pack due to inherent moisture. Particularly suited for foundry use.

Write Dept. 408 AMERICAN AIR FILTER CO., NC., LOUISVILLE, KY. For Complete Information.

AIR FILTRATION **AAF** DUST CONTROL

DUPLICATE PARTS *without jigs or fixtures*

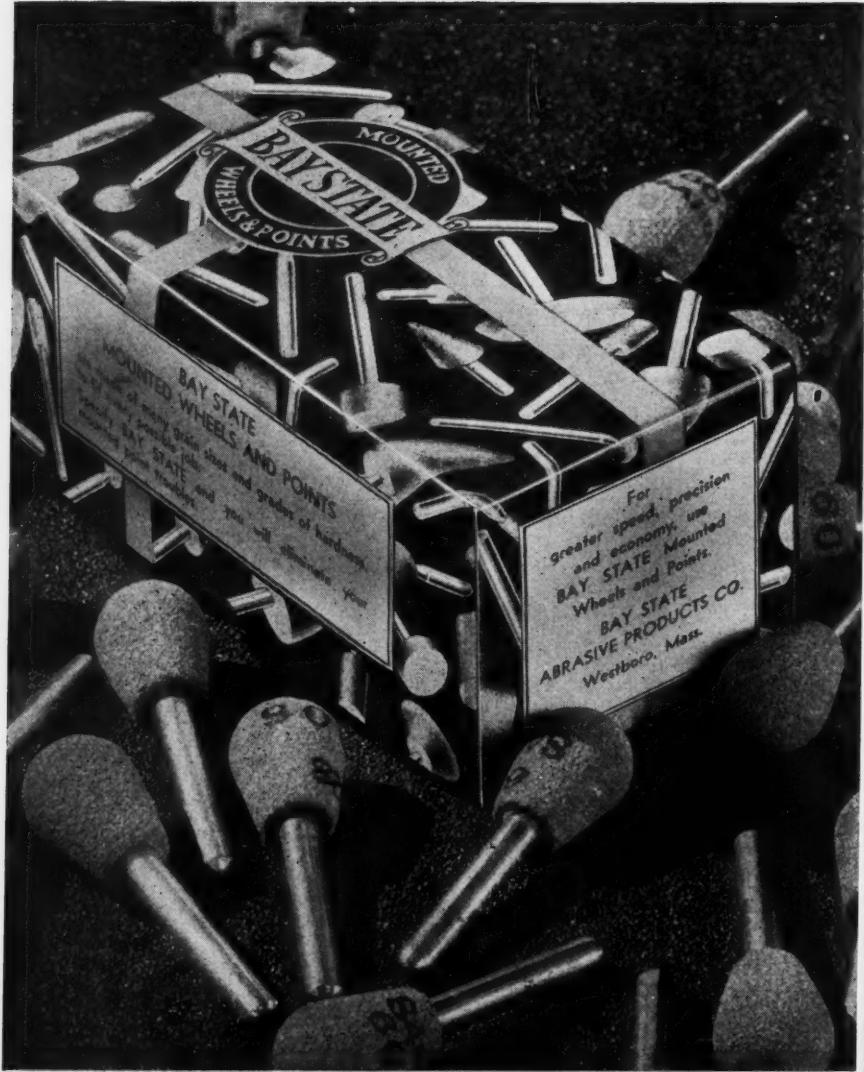


With this FOSDICK Combination Drill and Jig Borer, you can duplicate parts without jigs or fixtures. You can change and improve designs without cost of retooling. That's economy! And the price of this machine is within reach of practically every metal-working shop.

12 spindle speeds from 60 to 1,500 r.p.m. 9 feeds from .0025 to .020". Spindle travel 9". Working capacity 24" from spindle to table. Table 18" x 36".

WRITE FOR CATALOG MSJ.

FOSDICK MACHINE TOOL CO. • CINCINNATI, OHIO



BAY STATE ABRASIVE PRODUCTS CO.
WESTBORO, MASSACHUSETTS





Because They Carry Heavier Loads

FARREL-SYKES GEARS

Are Used in Toledo Presses

To secure greater load-carrying capacity and quiet operation, Toledo Machine & Tool Company equipped the press shown above with Farrel-Sykes continuous tooth herringbone gears. This is a double-action press with two slides, an outer slide for holding the work and an inner slide or plunger. It is 38' 7" high, 128" between uprights and weighs about 450,000 pounds.

The herringbone teeth of the Farrel-Sykes gears provide greater bearing surface, which is responsible for their greater strength and ability to carry heavier loads. The overlap and creeping engagement of the teeth, together with the inclined line of

pressure, make the gears wear much longer. Throughout their entire life they retain their involute profile and correct tooth action.

Opposed helices balance and absorb axial thrust within the gear member, preventing harmful thrust loads and resultant stresses on other parts of the machinery.

With extra strength and smooth, quiet operation Farrel-Sykes gears also offer the advantages of less weight and smaller size. They are built for every type of service and for any capacity. Full information will be sent on request.

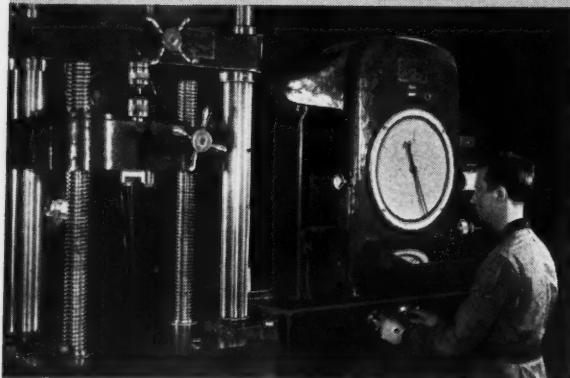


FARREL-BIRMINGHAM COMPANY, Inc.
381 VULCAN STREET - - - - - BUFFALO, N. Y.
The Gear with a Backbone

A SAFETY FACTOR TO Resist "Sledge Hammer" Shocks

- BUILT INTO EVERY PARKER-KALON
COLD-FORGED SOCKET SCREW

PRECISE CONTROL OF DUCTILITY — To protect you against failure of socket screws under heavy shock loads, Parker-Kalon controls vital ductility to a "hair's breadth." On this modern Olsen Machine in Parker-Kalon's Laboratory, socket screws are literally pulled to pieces, then checked for elongation. You'll never see a brittle Parker-Kalon Cold-forged Socket Screw!



"16 POINT QUALITY-CONTROL" Leads Critical Buyers to Demand PARKER-KALON

A Ductility Test is only one of 16 check-ups on important characteristics of Parker-Kalon Cold-forged Socket Screws. In a laboratory without counterpart in the industry, quality is guarded by thorough tests and inspections covering:

1—Chemical Analysis. 2—Tensile Strength. 3—Ductility. 4—Torsional Strength. 5—Ability to take Shock Loads under Tension. 6—Resistance to Shock Loads under Shear. 7—Hardness. In addition, there is a rigid inspection:

tion of these essentials: 8—Head Diameter. 9—Head Height. 10—Concentricity of Head to Body. 11—Socket Shape. 12—Socket Size. 13—Socket Depth. 14—Centrality of Socket. 15—Class 3 Fit Threads. 16—Clean Starting Threads.

In this way Parker-Kalon maintains a new higher standard of quality in Socket Screws . . . a standard that satisfies the most critical buyer. Send at once for free samples . . . see for yourself.

PARKER-KALON CORP., 198M Varick Street, New York, N. Y.



PARKER-KALON  **SOCKET SCREWS**

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK

SHELL TURNING With the New MODEL "R-14" AUTOMATIC LO-SWING

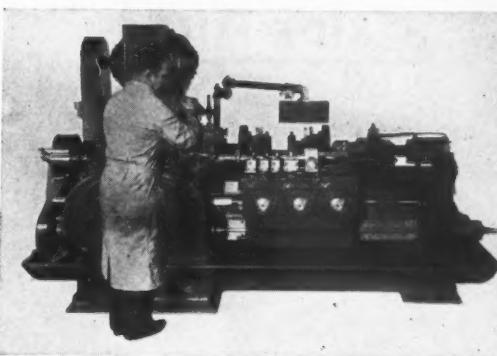
Day in and day out shell production on a 24 hour basis is the supreme test for a multiple tool automatic lathe. Conditions in a shell plant are such that down time for adjustments and repairs cannot be tolerated. Seneca Falls engineers, through wide experience and continued application on this type of work, have developed a method of shell turning, and embodied it in the Model "R" line of Lo-Swings that have proven very successful.

The exacting requirements of this class of work are admirably met by the new Model "R-14," largest and heaviest member of the Lo-Swing family.

First—Rigidity and proper support for both the work and tools. This is of prime importance with HS steel tools but especially so when carbide tools are to be used. Lo-Swing construction meets this requisite by its massive head and tailstock; its carriage and way design which takes tool thrust directly into the bed; its hardened and ground way plates which overcome wear and the subsequent looseness and play fatal to accuracy and carbide tools; and its mechanical cam-controlled cycle which gives smooth and unvarying feeds to carriage and cross slides regardless of amount of stock or run-out on the shell.

Second—Unfailing power through the spindle drive, the feed works, and the shell driver itself. The Model "R-14" meets these requirements with a heavy clutch and motor drive, oversize shafts with hardened gears, feed works proportionately heavy, and an internal driver which maintains the close concentricity so necessary between the bore and O. D. and has never been known to slip.

Third—Minimum amount of down time for any reason whatsoever. The Model "R-14" minimizes down time by reason of its simplicity; massive design and such features as automatic lubrication to head and carriage; its safety clutch which allows the feed to stop, if a jam occurs, without throwing the various units out of time; the quick and easy method of tool

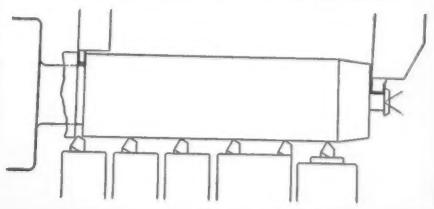


changing; and above all, the elimination of all "bugs" which, though minor, take a terrific toll out of the production sheet.

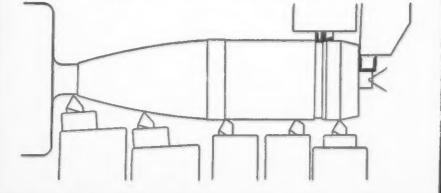
The machine illustrated is tooled for rough turning a 105m/m shell. The shell is located from the bottom of the bore and the back attachments simultaneously cut off the open end to length and face the closed end. A template controlled tool block on the carriage is used for turning the contour.

Over a period of years Model "R" Lo-Swings have demonstrated their suitability for this class of work and their ability to withstand the rough usage and abuse characteristic of shell turning service.

Tool layout for Rough Turning Operation



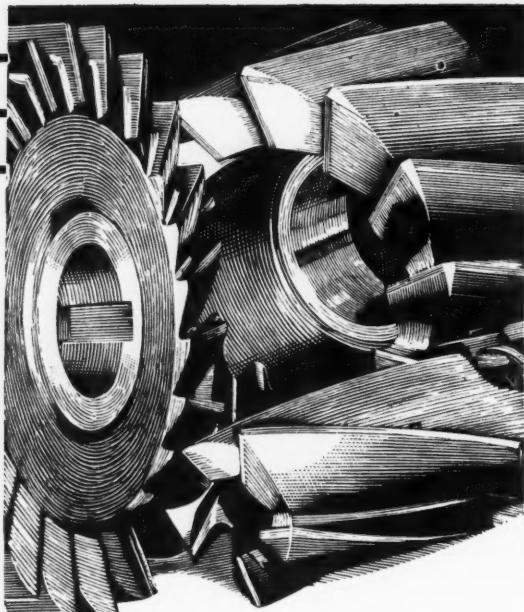
Tool layout for Finish Turning Operation



THE NEWS from SENECA FALLS

END MILLS SIDE MILLS

**A Proved Way
To Save Money**



Buy Barber-Colman Cutters

Users of Barber-Colman Milling Cutters know these good tools pay handsomely . . . that more "mileage" per grind adds up to substantial savings in cutter costs and valuable production time. The same general principles and practices which established leadership with ground hobs, the most difficult type of cutter to produce, are employed in making Barber-Colman Milling Cutters. Correct in selected material, tooth form and heat-treatment; made by cutter specialists, and rigidly inspected; Barber-Colman Cutters have maximum cutting power, rugged strength for heavy cuts, ability to earn profits. Buy Barber-Colman Cutters.



PRODUCTS
MILLING CUTTERS,
HOBS, HOBBING
MACHINES, HOB
SHARPENING MA-
CHINES, REAMERS,
REAMER SHARP-
ENING MACHINES,
SPECIAL TOOLS

BARBER-COLMAN COMPANY
General Offices and Plant ROCKFORD, ILLINOIS, U. S. A.

**OBJECT LESSON
FOR
INDUSTRY**



A GOOD MAN CAN'T DO MUCH WITH A POOR TEAM

(BASED ON THE ARTICLE, "A MAN AND A TEAM", BY WENDELL E. WHIPP.)

THE farmer—no matter how good he is—knows he can't turn out a full day's work with a broken down team.

A top lathe hand can't do his best work if his machine—the other half of his team—is old or inefficient.

Both know what's wrong with their production. But, the farmer may not be able to buy good horses, or, a tractor—and the lathe hand hasn't the authority to buy a modern machine!

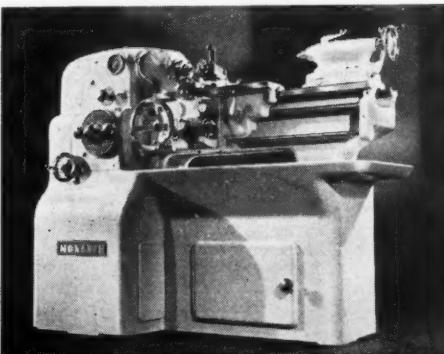
BUT you have . . . you can . . . and you should!

And you would if you realized that it's not the production you're getting that counts . . . but what you're NOT getting that affects your net profits.

If you net an average of 5%—what does it cost you . . . in cold cash . . . when, because of old machine tools, you FORCE your operators to produce 25% to 50% less than they should?

Can you afford to ignore those old machines? May we send one of our PROFIT ENGINEERS over to your office?

THE MONARCH MACHINE TOOL CO., SIDNEY, OHIO, U.S.A.
AGENCIES IN PRINCIPAL INDUSTRIAL CENTERS THROUGHOUT THE WORLD

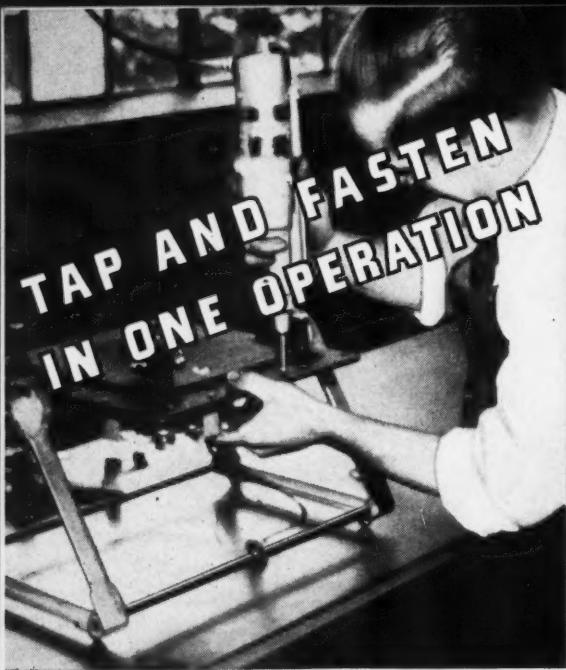


IF IT CAN BE TURNED,
MONARCH CAN LIKELY TURN
IT BETTER AND FASTER

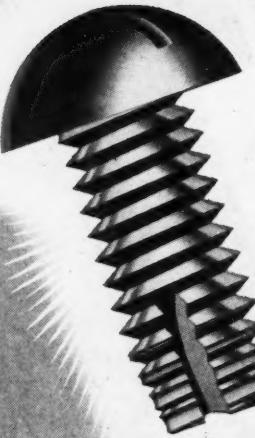
YOUR SMARTEST
INVESTMENT TODAY—
BETTER
MACHINE TOOLS!

MONARCH LATHES





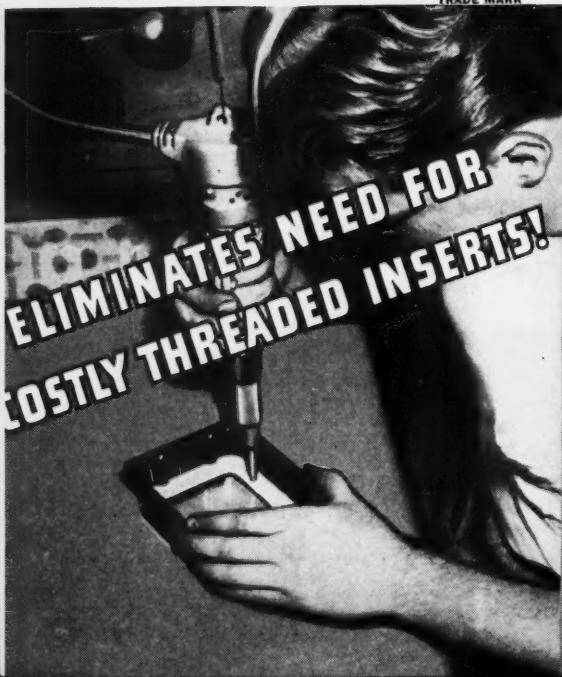
TAP AND FASTEN
IN ONE OPERATION



Note patented thread-cutting slot
with serrated cutting edge!

SHAKEPROOF

TRADE MARK



ELIMINATES NEED FOR
COSTLY THREADED INSERTS!



End view of double width slot
showing 70° cutting edge.

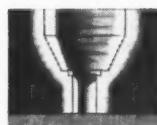
TIGHTER METAL FASTENINGS!

STANDARD TYPE
for all metal-to-metal
applications

Every designing engineer and production executive should investigate the advantages of this screw. It saves money, speeds up production, and its tighter fit assures stronger metal-to-metal fastenings than is usually possible with ordinary type screws.

PERFECT FOR ALL METALS . . . ANY THICKNESS!

Because Shakeproof Thread-Cutting Screws actually cut their own threads, a snug, tight fit for every screw is certain. The thread-cutting action is produced by the patented slot with serrated cutting edge, plus a special hardening process that makes each screw a practical tapping tool. Expensive tapping operations are eliminated—production is accelerated and better product performance is achieved. Test Shakeproof Thread-Cutting Screws on your product—write for free samples today!



1 First . . . Drill—



2 Then . . . Drive—



3 A Perfect Fit—



4 Replaceable with Ordinary
Machine Screw

Carried in stock
by leading mill
supply jobbers!

also available
with PHILLIPS
Recessed Heads

Thread-Cutting Screws

SPECIALLY DESIGNED FOR PLASTICS!

HI-HOOK TYPE
for all Plastic
applications



also available
with PHILLIPS
Recessed Heads

SHAKEPROOF LOCK WASHER CO.

Distributor of Shakeproof Products Manufactured by Illinois Tool Works
Plants at Chicago and Elgin, Illinois 2577 No. Kester Avenue, Chicago, Illinois
In Canada: Canada Illinois Tools Ltd., Toronto, Ontario
Copyright 1939 Illinois Tool Works

This, the only screw specially designed for plastic applications, will cut its own thread in even brittle molded parts without causing costly breakage. Its double-width slot provides an acute 70° serrated cutting edge that taps the thread as the screw is driven into the material. Now, threaded inserts and pre-tapping operations can be forgotten and important savings realized. Because each screw remains in the threads it has cut itself, a tight fit is assured and should replacement ever be necessary, an ordinary machine screw of the same size can be used as the threads are the same. Testing samples are free—write today!



SHAKEPROOF

REMS (Pre-assembled Shakeproof Lock Washer
and Screw) . . . Self-Locking Set Screws

"Fastening
Headquarters"

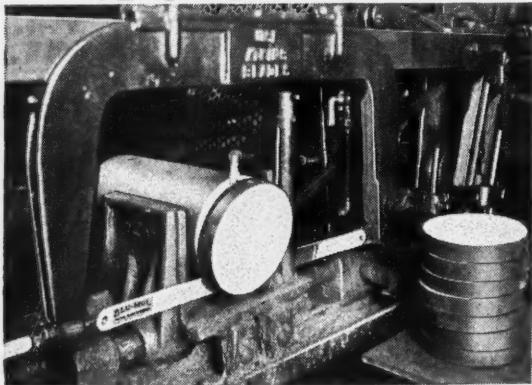
Lock Washers . . . Locking and Plain Terminals
. . . Spring Washers . . . Special Stampings



Sixty Minutes Every Hour for **FIVE LONG WEEKS**

BLU-MOL users keep on telling us of their enthusiasm for this molybdenum steel hack saw blade that provides the *lowest cost per cut* of *any* blade on the market. A recent letter says: "One BLU-MOL blade was in use continuously for five weeks, eight hours a day, five days a week. All kinds of metal were cut, and the blade proved *very satisfactory*."

Other users report 50% longer life and 60% cash savings. The uniform temper of BLU-MOL blades guarantees fast, clean work cutting tool steel at a typical cost of only $3/100$ of 1¢ per square inch. Give BLU-MOL a thorough, unbiased try-out on your own work. Without obligation, let us arrange for a demonstration that will prove to you that BLU-MOL cuts costs and speeds production.



IS STAINLESS STEEL YOUR CUTTING PROBLEM?

Millers Falls High Speed Steel hack saw blades developed specially for work on stainless steel and other extra-tough alloys, outdistance all others for speed, staying power, and clean cuts.

MILLERS FALLS COMPANY
GREENFIELD • MASSACHUSETTS



SPEED UP Your FORGING OPERATIONS

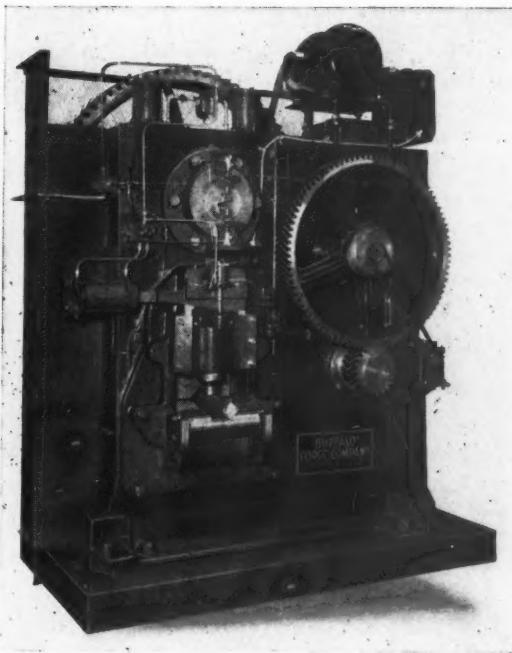
WITH

"Buffalo" **BILLET SHEARS**

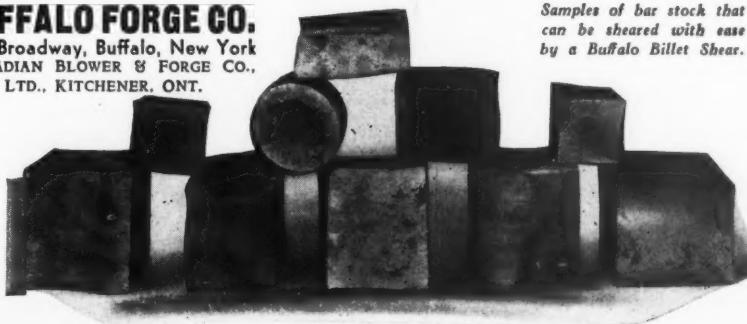
In dozens of forging shops, Buffalo Billet Shears are cutting stock for the hammers in eight, sixteen or twenty-four hour shifts. Absolutely uniform cuts are assured—steady uninterrupted service means that your forging operations are never delayed. If you want to know how inexpensively you can cut billets—ask us for full information and price of a machine to cut your stock.

BUFFALO FORGE CO.

388 Broadway, Buffalo, New York
CANADIAN BLOWER & FORGE CO.,
LTD., KITCHENER, ONT.



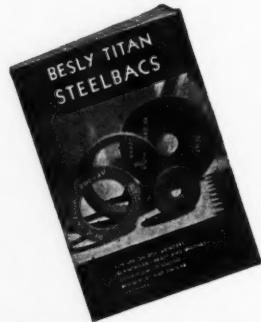
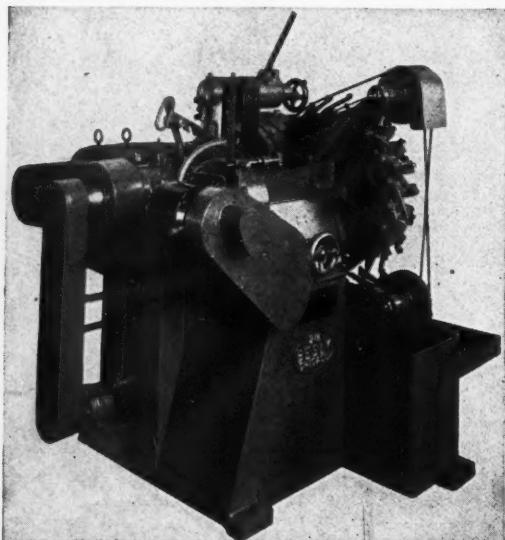
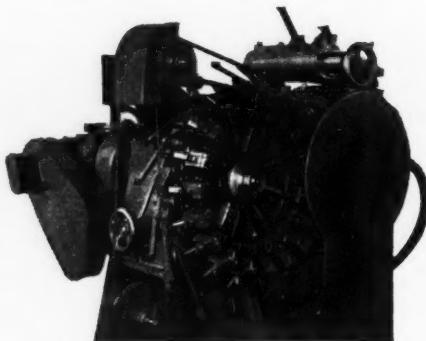
*Samples of bar stock that
can be sheared with ease
by a Buffalo Billet Shear.*



1800 valve stems ground per hour ON BESLY GRINDER

Illustrations show No. 218—20" Wet Single Spindle Besly Grinder equipped with Rotary Feed especially arranged for grinding ends of automotive valves.

- Operator places valve in work station, the piece is automatically clamped by means of cable actuated lever and drops out of the station by gravity after grinding is accomplished.
- This is one of the many specific purpose Besly Grinders recently developed by us. Perhaps you have some flat surfacing operation in your plant that could be handled to wonderful advantage on a Besly Grinder. Let us have particulars and we will give you the benefit of our long varied experience.



[Write for your copy
of Booklet on Besly
Titan Steelbacs.]

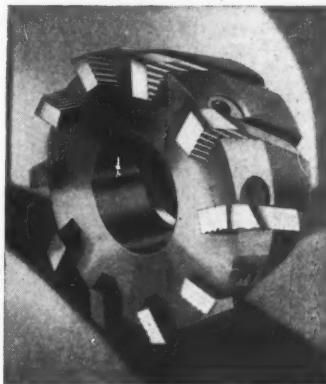
- Learn about these bolted-on Discs (with 1", 2" and 3" of Resinoid Bonded Abrasive) which are gradually being adopted by most users of Disc, Surface or Face Grinders.

CHARLES H. BESLY AND COMPANY
118-124 NORTH CLINTON STREET • CHICAGO, ILLINOIS

RIGID ASSEMBLY
for milling faster
QUICK ADJUSTMENT
to shorten down-time
JACK-LOCK
MILLING CUTTERS



McCrosky's compact JACK-LOCK Wedge provides reserve locking power to insure rigidity when speeds and feeds are increased to cut costs. TRU-GROUND serrations in the blades mesh perfectly with body serrations to deliver every pound of the positive JACK-LOCK gripping power . . . When the cutter has to be resharpened, Adjusting Screws behind the blades provide a quick and controlled means of holding to a uniform minimum the blade stock to be ground away and of shortening down-time.



Bulletin 15-M shows and lists JACK-LOCK Cutters with high speed, Stellite-J, and Tungsten Carbide blades...Ask for a copy.

McCrosky Tool Corporation
Meadville, Pa.

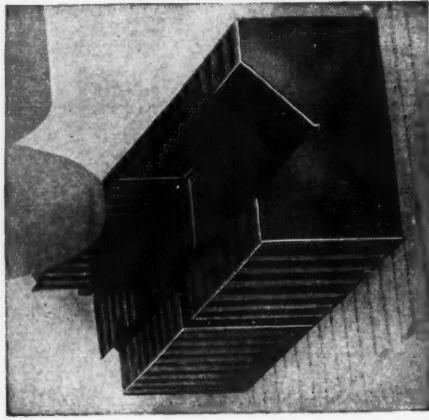
McCROSKEY JACK-LOCK
Inserted-Blade
MILLING CUTTERS



ACCESSORIES FOR ANY MAGNETIC CHUCK FOR HOLDING IRREGULAR SHAPED PIECES TO BE GROUNDED AT ANY ANGLE

KARNETICS CONDUCT MAGNETISM FROM CHUCK TO PIECES TO BE GROUNDED AND HOLD THE PIECES AS THOUGH THEY RESTED ON THE CHUCK ITSELF.

ENLARGE THE SCOPE OF YOUR MAGNETIC CHUCK WITH KARNETICS AND ELIMINATE COSTLY SPECIAL FIXTURES. INCREASE PRODUCTIVITY AND SAVE SET-UP TIME.



"V" BLOCK

WRITE FOR BOOKLET DESCRIBING THESE
TOOL ROOM NECESSITIES.

PARALLELS

ESTABLISHED 1916

PROTRACTOR BLOCK



October, 1939

THE KAR ENGINEERING COMPANY, Inc.

NEW YORK, N. Y.

203 HUDSON STREET

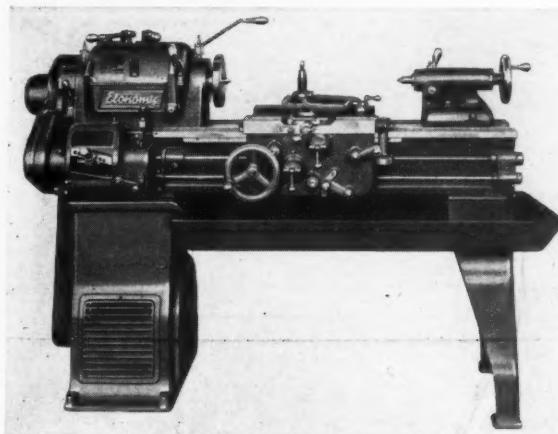


High Quality BIG VALUE

Economy

LATHES

for commercial shops . . . for schools



Write, today for
new Economy
Lathe Circular



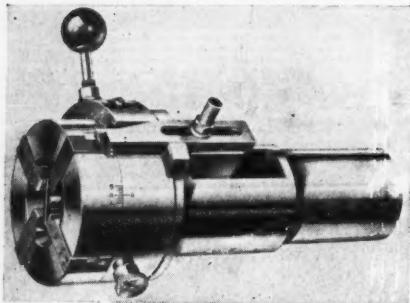
In manufacturing, and maintenance shops, in tool rooms; in manual arts, apprentice and engineering schools . . . Economy Lathes everywhere demonstrate their outstanding value on widely varied work. Here are accuracy, stamina, power, convenience for all ordinary commercial purposes; modern features and safety for schools; high quality at low cost for every purchaser. Made in Geared Head and Cone Head types, in 12", 14" and 16" sizes. Geared Head has twelve quick-change spindle speeds; Timken precision bearings; both types have independent feed shaft with interlocking safety clutch; double-wall apron; thread-cutting dial; many other advantages. Buy Economy Lathes and get big value.

● Investigate the many money-saving advantages of Economy Lathes. New Bulletin No. 393 gives specifications and full description of these big value tools. Write for bulletin, today; ask about low prices.

Economy lathes are made by the manufacturers of Hy-Draulic Shapers, Shaper-Planers, Planers and Slotters noted for speed, accuracy, fine work. Information on request.



ROCKFORD MACHINE TOOL CO.
ROCKFORD, ILLINOIS, U. S. A.



BETTER Taper Threads

Cut with Less Power

If you cut taper threads—pipe threads or otherwise—you'll be interested in the facts on the Style CT Geometric Taper Die Head.

With this tool the taper is positively controlled by a hardened and ground taper bar. Furthermore the principle of this tool is such that you can cut a taper thread just as easily as you can cut a straight thread. Less power required; better threads; more accurate threads; no objectionable lines.

WRITE FOR CT BOOKLET

But get all the facts. Write for a copy of the Style CT Taper Die Head booklet. No obligation — of course.

THE GEOMETRIC TOOL CO.
NEW HAVEN, CONN.



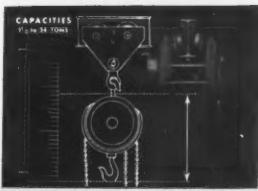
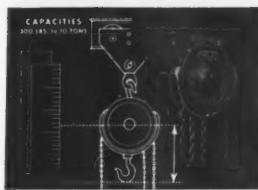
WITH YALE HEADROOM SAVING HOISTS

If someone told you that you could enlarge your plant without change or expense, you'd probably laugh.

Nevertheless, where faced with a problem of close headroom, you can actually do just that—by installing Yale Headroom Saving Hoists! Put them on the job and immediately valuable inches are added.

For headroom saving of minor proportions, the Clevis Type Hoist is suggested. This hoist saves from 3 to 16 inches depending on the capacity involved. Should this prove inadequate, the Trolley Type Hoist should next claim your attention. This will save from 8 $\frac{3}{4}$ " to 2' 3" according to capacity. In the event that a still greater saving is required, Yale has developed a hoist that will settle practically all headroom problems—the Rail Hugger. Providing the shortest headroom available in any hand hoist, it will save from 18" to 5' 1" depending on capacity. It's Headroom Saver No. 1!

Yale Hoists in every sense of the word, these headroom savers offer all the speed . . . safety . . . and economy that have been setting industrial standards for years. Get further details from your local distributor or write for free literature.



THE YALE & TOWNE MFG. CO.

PHILADELPHIA DIVISION, PHILADELPHIA, PA., U. S. A.

IN CANADA: ST. CATHARINES, ONT.

A HUSKY DRILL



for
Heavy
Jobs

• Footburt Sensitive Drills are built rigidly enough to maintain accuracy over a great many years. With the addition of the back gear unit, larger counter-boring and spotfacing operations in tool steel are possible.

The No. 2 machine is a "Full Range Drill".

Write for Latest Circular

THE FOOTE-BURT COMPANY
CLEVELAND, OHIO

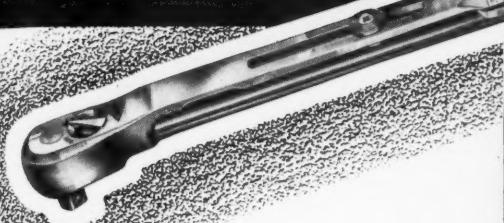
Detroit Office: 4-151 General Motors Building

FOOTBURT SIPP SENSITIVE DRILLS

WILLIAMS

SUPERIOR DROP-FORGED TOOLS

TORQUE "MEASURRENCH"

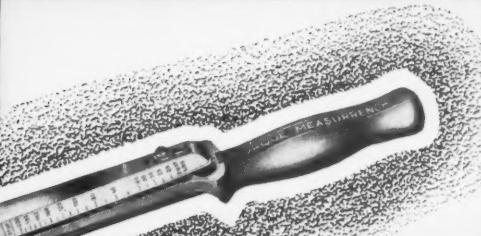


for
**PRECISION
MEASUREMENT
of TORQUE LOADS**

Williams' new Torque "Measurrench" No. S-57 combines new mechanical features with unusually rugged construction. Accuracy does not depend on delicate gears, levers, or dials but upon heavy sections of high-tensile steel. Right-hand torque is measured, and the wrench action reverses for left-hand turning. It can be used with any detachable socket having 1/2" square drive-opening. Torque loads are measured either by sight reading or by sound signal for any desired torque to 200 foot-pounds.

Made of alloy and high-tensile steel, scientifically heat-treated and finished in chrome-plate with "satin" chrome handle. Length, 19-1/2". Ask your mill supply distributor, or write for literature.

1-583B



For Limiting Torque in Tightening
DIE CAST ALLOY METAL PARTS



For precision measurement of
TORQUE LOADS IN EXACTING WORK



For all Applications requiring
EQUAL TENSION ON NUTS, STUDS, ETC.

J. H. WILLIAMS & CO.

HEADQUARTERS FOR

225 LAFAYETTE ST., NEW YORK

WRENCHES
OF ALL
TYPES



TOOL HOLDERS



"C" CLAMPS



LATHE DOGS



PIPE VISES



PIPE TONGS



THUMB NUTS &
SCREWS

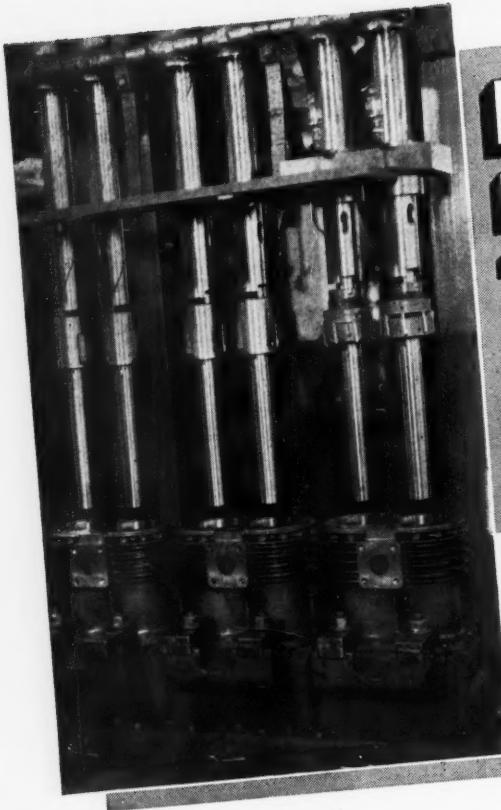


HOIST HOOKS



EYE BOLTS





DAVIS BORING TOOLS

Perform for
Carrier
Air Conditioning

Set-up time reduced to a minimum by the quick and accurate interchangeability of Davis Expanding Blocks

In this set-up, Davis Expanding Block Type Boring Tools are used to bore compressor cylinders for the Carrier Corporation, Syracuse, N. Y. These dependable Davis Tools, mounted in a six-spindle Moline Cylinder Boring Machine, rough and finish bore the cylinders, after which the latter are finish-reamed to size.

Davis Block Type Boring Tools have proved very efficient on this set-up. Their quick and accurate interchangeability has reduced the set-up time to a minimum and resulted in a very satisfactory and economical performance. Send us prints of your work and, without obligation, we will submit you a helpful, specific recommendation.

DAVIS BORING TOOL DIVISION

Larkin Packer Company, Inc., St. Louis, U. S. A.

DAVIS BORING TOOLS

YOUR TOOL ROOM

IS YOUR FIRST LINE DEFENSE AGAINST HIGH PRODUCTION COSTS

**You Will Be Wise
To Give It Consideration Now!**

Modern production machines are designed to use modern cutting Tools — carefully ground to proper angles and clearances and close tolerances.

* * *

Why buy modern machine tools unless you keep them modern by providing properly sharpened cutting tools.

* * *

Oliver of Adrian Drill Grinders, Tool and Cutter Grinders, Face Mill Grinders, Tap Grinders, etc., are the most modern, up-to-date and reasonably priced grinding machines available anywhere. They are designed and built to give you easy operation — fast and efficient service — reground tools that will out-perform — tools that will last longer between grinds, eliminate breakage, reduce scrapped parts and cut machine down-time.

* * *

Send for illustrated booklets that will show you the way to more profits thru modern tool reconditioning methods.



Cut illustrates the new 510 Oliver automatic twist drill pointer—for drills $\frac{1}{4}$ to 3" — Variable point angles — variable clearances.

WE ALSO BUILD OLIVER DIE MAKING MACHINES

OLIVER INSTRUMENT COMPANY
1430 EAST MAUMEE STREET . . . ADRIAN, MICHIGAN



JOHNSON GENERAL PURPOSE BRONZE BEARINGS

*Write for
FREE
CATALOGUE
and the location of
your nearest source
of supply.*

● Here is a bearing service designed to meet your needs. The exact size you require in any quantity . . . every bearing machine finished, ready for assembly . . . stocks conveniently located for immediate service.

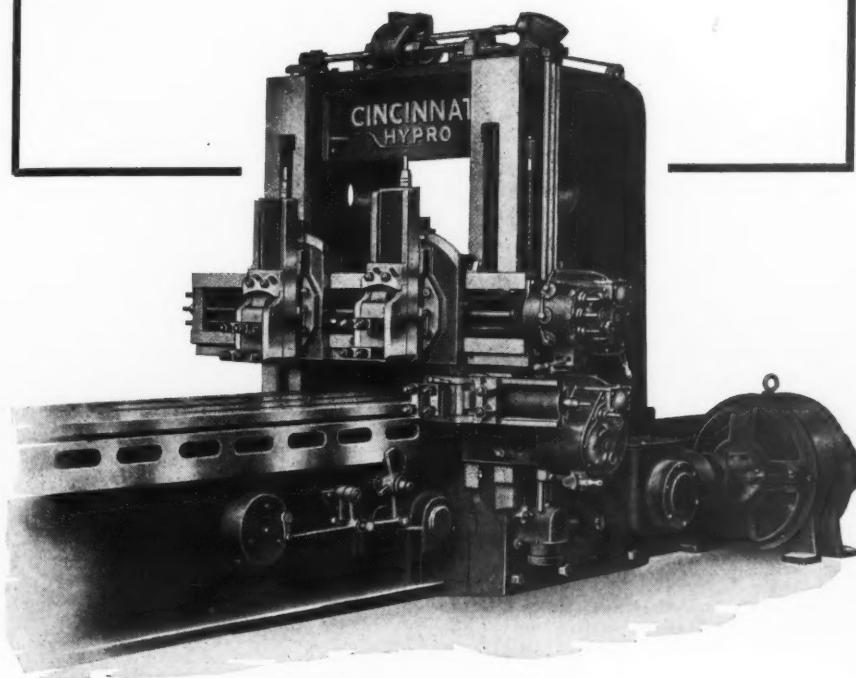
Every Johnson General Purpose Bearing is cast in S. A. E. 64 — Copper 80%; Tin 10%; Lead 10%. This alloy combines, in the correct proportions, all the necessary elements to insure the greatest performance.

Specify Johnson Bronze on your next order. Test them in comparison to any you have ever used. Convince yourself that here is the best general purpose bearing bronze available.



JOHNSON BRONZE
Sleeve BEARING HEADQUARTERS
590 S. MILL STREET • NEW CASTLE, PA.

ALL HERRINGBONE GEARING TO TABLE DRIVE



The smooth, even flow of power through the complete herringbone balanced gear train to the table produces smooth finished parts. It is a balanced drive free from any loss due to side pressure. Being an all steel unit flooded with oil, it is capable of withstanding the heaviest cuts for an indefinite time.

Other features: Selective Dial Feeds, Instantaneous Rail Lift, Renewable Steel Tee Slots, Independent Feeds and Rapid Power Traverse to the Heads, Reinforced Tool Block Abutment, Inverted Dovetail Slides, Massive Pyramid Type Housings, etc.

WRITE FOR COMPLETE CATALOG.

THE CINCINNATI PLANER CO. CINCINNATI
OHIO, U. S. A.

ARMSTRONG

ANNOUNCES THE NEW C-39 CATALOG

*A complete catalog showing
all ARMSTRONG TOOL
HOLDERS and TOOLS
"ARMSTRONG BROS."
PIPE TOOLS.*



- ***Armstrong Tool Holders**—a complete System of Tool Holders, tool holders for every operation on lathes, planers, slotters and shapers.
- ***Armstrong Turret Lathe and Screw Machine Tools**
- ***Armstrong Bits, Blades and Cutters**
- ***Armstrong Lathe and Milling Machine Dogs**
- ***Armstrong Machine Shop Specialties**
- ***Armstrong "C" Clamps**
- ***Armstrong Setting-up Tools**
- ***Armstrong Carbon Steel Wrenches**
- ***Armstrong-Vanadium Wrenches**
- ***Armstrong Detachable Head Socket Wrenches, Bridge Ratchets and Hollow Screw Wrenches**
- ***"Armstrong Bros." Pipe Tools**

- { The standard cutting tools everywhere—used in over 96% of the machine shops and tool rooms.
- { Permanent multi-purpose tools for standard operations.
- { High Speed Steel and Armide (Carbide-tinned).
- { Drop Forged—11 types.
- { Dron Forged, 5 types, all sizes.
- { A complete line of Stran Clamps, Planer Jacks, T-slot Bolts, etc.
- { 28 types each in all sizes, also sets.
- { 18 types—open end box socket wrenches.
- { 11 types, all sizes and sets with drop forged ratchets, handles and extensions.
- { The most complete line of pipe tools manufactured.

Just off the press! Sent upon request. Write for your copy today.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

328 N. FRANCISCO AVE., CHICAGO, U. S. A.
Eastern Warehouse and Sales: 199 Lafayette St., New York
San Francisco



ARMSTRONG TOOL HOLDERS Are Used in Over 96% of the Machine Shops and Tool Rooms

MODERN Machine Shop

OCTOBER, 1939

VOL. 12, No. 5

CINCINNATI, OHIO

Practical Heat Treating

The second article of the series, in which the author discusses Bath Casehardening and points out the important features of this process.

By FREDERICK TAYLOR POTTER

THE science of surface hardening low carbon steels by the use of cyanide has progressed a long way since that day when it was considered sufficient to heat the steel red hot, sprinkle a little cyanide on it, and quench it in water. It is true that the resulting surface was file hard and that it was beautifully mottled if the piece had been dipped in water progressively deeper with a series of short plunges. Its wearing qualities, however, were little improved by the experience. A case of perhaps 0.002 in. was all that the hardener could expect, or 0.003 in. if he were lucky. Today, with the new types of hardening salts available, the case depths that can be obtained compare favorably with those secured by pack hardening, and besides which

they excel them in speed.

Modern bath casehardening is employed for the surface hardening of screws, nuts, and many larger parts which ordinarily are made from the low carbon, free machining steels and are to be used in the "as hardened" state; that is, without grinding. With case depths of 0.008, 0.012, or 0.020 in., such pieces will give excellent service. In some cases, such as certain screws, the shallow case is preferred to the deeper one because it prevents the threads from becoming brittle enough to strip, as they might do if the hard case were too deep. In slotted head screws it provides sufficient strength to resist damage from the screw driver without being so brittle as to chip. On other parts a one-hour treatment with its 0.010



Frederick Taylor Potter

to 0.013 in. case will provide wear resistance and prevent undesirable scratching or marking in use.

For such work, while the usual Bessemer screw stock or "machinery" steel is often used, better results as in pack hardening will be obtained

Furnaces for pack carburizing work are of the pot type and may be heated by oil, gas or electricity. The heating costs usually rise in the same order but are offset to a certain degree by the maintenance expense, which goes in the opposite direction.

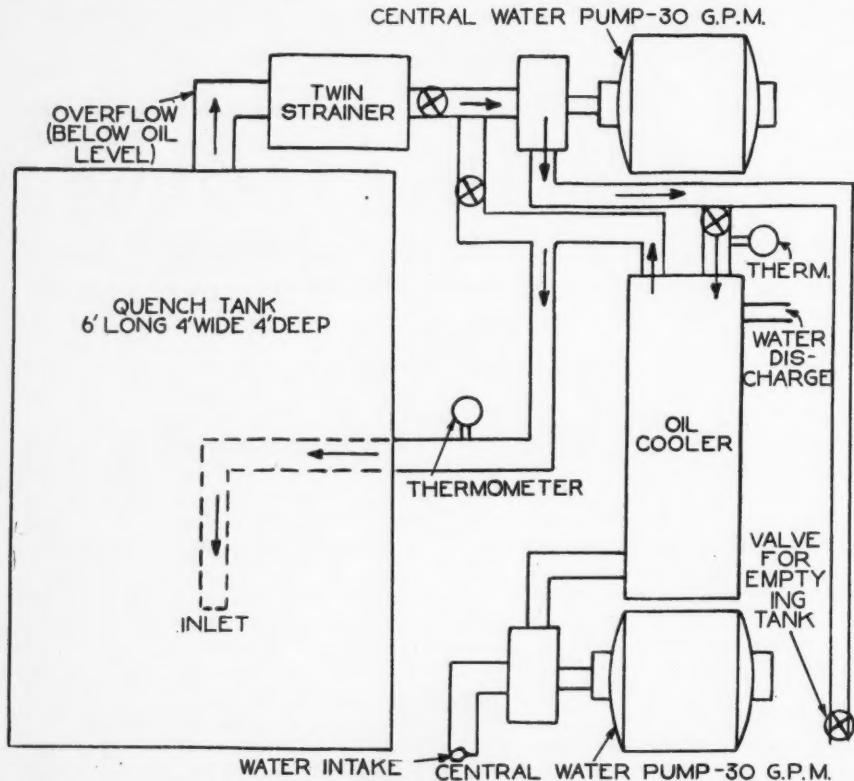


Fig. 1—Drawing of a circulating oil system designed for the quenching of a 300-lb. load every $1\frac{1}{2}$ hours.

if materials such as SAE X1315 are used. This steel machines freely, is designed particularly for casehardening, and will be less likely to have the soft spots which may be found with the Bessemer steels. In designing a part to have such treatment, it is well to consider this point.

In the case of the oil unit the fuel is cheap but, due to the nature of the combustion, it generally erodes the lining and scales the pot faster than gas. It has the disadvantage, too, of being smoky at times and of almost always leaking slightly. In addition, it is less easily controlled by auto-

work
heat-
heat-
same
de-
dense,
tion.

matic means than gas, due to its smaller range of turndown. Gas is readily controlled and is clean in operation. It is considerably less destructive to furnace lining and pot than oil and in most respects is the better fuel for this application.

Electricity is cleaner and more accurately controlled than either of the fuels. If not allowed to become overheated, the elements should give 2,500-3,000 heat hours of service. However, they may easily be damaged if the pot is allowed to leak for any length of time so that the salt freezes in and around them. In the past several years electric furnaces have been developed which overcome most of the objections.

The furnace consists of a heavy steel pot, usually rectangular, set directly into a lining of efficient, insulating firebrick contained in a steel shell. Heating is accomplished by current led through a step-down transformer and thence at eight to twelve volts to one or more pairs of alloy electrodes which extend down into molten salt.

The heat is generated by the resistance of the salt and depends to a certain degree upon its conductivity. A new bath will conduct more current than one which has become depleted. This type of furnace is very efficient because the heat is generated right in the pot where it is used and because the heating of the pot and refractory is secondary to the heating of the salt instead of being essential to it as in a fuel-fired furnace. This feature allows more sensitive control of temperature and greatly reduces erosion of both pot and lining. In fact, the carbon steel pot and electrodes of such a unit should last at least a year.

Oil and gas-fired furnaces are less expensive to install than the elec-

tric, particularly those of the electrode type. They are perfectly satisfactory for most applications, but are not as suitable as the electric for use in a production line.

Automatic control is desirable on any furnace intended for production purposes. Best uniformity of temperature is, of course, obtained on electric units. With fuel firing, motorized valves for regulation of air and oil are essential but have reached a high state of perfection and will cause little trouble.

To the user remains the decision of whether he wishes records of his heats. Recording instruments cost but little more and in most cases are worth it. Since most of the heats are of short duration on bath work, the round chart instrument will be found very satisfactory and may be easily read from a distance because of its large scale and figures.

Cyanided work may be quenched in oil, water or brine. In water or brine the case on a one-inch section will reach the equivalent of 65 Rockwell C, while in oil it will be four to five points lower. Water quench equipment needs little explanation except that there should be enough water to prevent the tank temperature from rising above 90 deg. F. For production of over 50 pounds per hour it is practically necessary to have a good circulation, which can be provided by having a two-inch pipe inlet in the bottom with a four-inch outlet at the top. The introduction of air as an agitator is poor practice as it may cause soft spots on any hardened piece.

In designing an oil-quench system, extra care is required because oil will not cool as rapidly as water after a heat is dumped, and also because the quantity of oil is limited. If an oil of about 100 viscosity with a flash point

of around 430 deg. F. is used, it is advisable to keep its temperature below 125 deg. F. because at the surface where it is the hottest the temperature will be considerably higher than this and may flash. A fire in an oil tank where the oil is already hot is undesirable, to say the least.

Figure 1 illustrates a circulating

This system also includes a valve arrangement with piping which leads the oil outside and to the front of the tank so that by attaching a short, vertical pipe and a faucet, the pump may be made to empty the tank into barrels so that it can be cleaned. This device is simple and satisfactory. With a 30 g.p.m. centrifugal

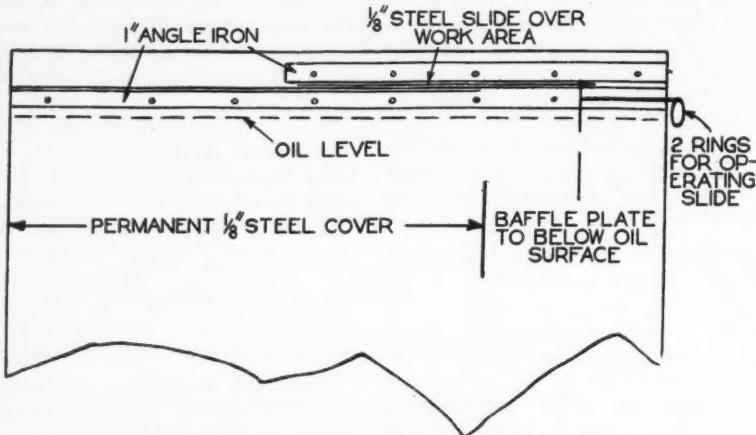


Fig. 2—Design of sliding cover for fire control on oil-quench tank.

oil system which will handle the quenching of a three hundred pound load every 1½ hours and will not run over 125 deg. F. even when the cooling water is up to 75 deg. F. It is similar to that described in the previous article on carburizing with the exception of two valuable features.

The inlet enters through the center of the bottom and continues up and forward through the tank to a point a foot below the surface and just behind where the work is lowered into the oil. Through a 45 deg. elbow the stream of low-temperature oil from the cooler breaks the surface under the work as it enters and keeps that point much cooler than would otherwise be possible. This will reduce flashing to a marked degree.

pump, the 600 gallons may be pumped out in a reasonable length of time.

Every large oil-quench tank should be fitted with some sort of fire control equipment. For one with 25 square feet of surface, two foam-type extinguishers should be within easy reach. These extinguishers should be located far enough from the tank so that a quick fire will not prevent their being easily accessible.

Since the foam is likely to emulsify with the oil and will not improve its quality, it is suggested that the extinguishers be used as a last resort and some sort of quick-acting cover to smother the fire be used first. Fig. 2 shows a sliding cover which has been found effective. It

valve
leads
t of
short,
ump
into
ned.
fac-
ugal

will be noted that in this tank, with a surface of 4×6 ft., a space only 18 in. from front to back and 4 ft. wide remains unprotected by a permanent $\frac{1}{8}$ -in. steel cover. This open space is provided with a cover which moves on angle iron slides and may be pulled into position instantly through two steel cables at the sides which run through the front of the tank.

The cleaning of cyanide compounds from water-quenched work presents no problem, since the steam formed practically blows off the salt. With oil quenching the situation is far different. The work must be thoroughly washed, otherwise a certain amount of salt and a very dirty film of oil will remain, particularly on work with rough or irregular surfaces.

Figure 3 shows the principle of the two wash tanks used in connection with the quench tank mentioned above. The main feature is the steam chest at the front end, which provides excellent circulation as the temperature nears the boiling point. This not only promotes quick cleaning but through the rapid motion of the solution rearward the heavy film of oil which gathers at the top is kept to the rear and prevented from collecting on the work again as it is lifted out.

The steam coils are made of standard $1\frac{1}{2}$ -in. iron pipe, connected in series. They do not open into the tanks, but are led back into the plant steam system. The steam coils are connected into the tanks at the front where two couplings are welded into each tank below the level of the steam chest. It is essential that all joints in the chest be made steam tight since a surprising amount of pressure is generated and is necessary to its proper operation.

With the correct amount of strong alkali solution in the bath, one-half to one hour in each tank will clean the work either perfectly or leave a film of oil hardly sufficient to dirty the hands. In this connection, with most cleaning materials the tendency is to use too much. Given good, fresh material, very little is needed. If the

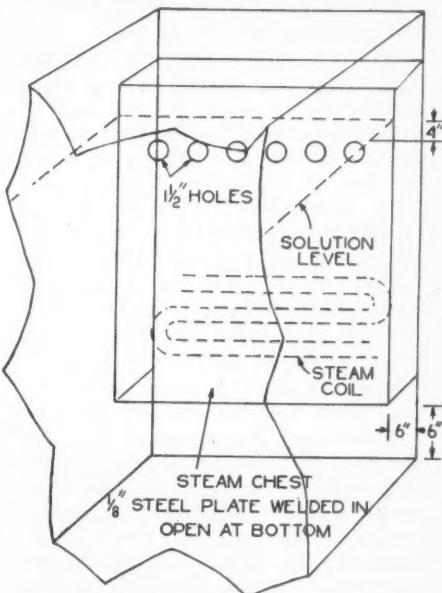


Fig. 3.—Diagram illustrating principle of wash tanks used in connection with quench tanks. The steam chest at the front end provides circulation as the temperature nears the boiling point.

solution does not seem to clean properly, add more water before you add more alkali, since it is probably already too rich.

Due to the nature of bath treatment, practically all work must be handled in some sort of fixture. Small parts, such as screws or nuts, may be placed in mesh baskets of a size not too large for safe handling, in which they are suspended from hooks

or rods placed across the top of the pot. Gears, bushings and other pieces with holes, if not in too large quantity, may be strung in groups on soft iron wire and hung from hooks or rods. Small pieces may also be handled in ladies made from 6-in. pipe with welded-in bottoms drilled full of holes, closely spaced. These ladies can be fitted with handles of suitable length welded or riveted on.

In Fig. 4 is an example of a single-purpose fixture intended to hold up to seventy $\frac{1}{8}$ -in. shafts 30 in. long. It weighs approximately 80 pounds and will carry over 250 pounds of work. It must, of course, be handled by a crane mechanism. An interesting feature of this application is that while the shafts are not separated in the fixture and are quenched as one solid mass, there is no appreciable difference in case depth or hardness between inside and outside shafts.

Simple and inexpensive fixtures for bath work may be made of low carbon steel, but since most of them are designed to be suspended in the salt they will rather rapidly lose their shape due to the weight supported by them. Whenever possible, as in the case of the single-purpose fixture mentioned above, the application should be so designed that the fixture will rest on the bottom of the pot or preferably on some support placed there. This expedient will to a large extent reduce sagging.

The use of a support or false bottom in the pot will reduce uneven heating which otherwise might be caused by the precipitate or sludge in the bottom. For frequently-used fixtures, alloy steels similar to Allegheny 66 or Uniloy 24-11 will give far longer service than carbon steels and will more than repay their greater cost.

Overhead handling equipment is

necessary for heavy work and usually must be designed with a particular installation in mind. Since cyanide fumes are very corrosive, one of the basic principles of design is to keep electric motors, switches and other mechanisms as far as possible from the pot.

Figure 4 shows a production furnace installation the design of which incorporates a successful trolley hoist with half-ton capacity. A steel cable is made fast to one end of the rail, is led over to sheave on the trolley, down under the load block, up over the other trolley sheave and thence to a standard electric hoist strongly mounted a short distance beyond the other end of the rail. A lowering and hoisting speed of forty feet per minute will be found satisfactory and will prevent serious flashing even on long and heavy loads.

The trolley traverse is effected by a gearmotor-driven drum mounted a short distance from the end of the rail opposite the hoist. The cable is attached to the end of the trolley nearest the hoist, is led up over a sheave on the hoist end of the rail, along the top of the rail, around the gearmotor drum three times and then to the other end of the trolley. From a single pushbutton box controlling all motions, current is carried through a cable festooned from a wire running the entire length of the work space, permitting operation from practically any point in the room. All electrical equipment, including limit switches, is some distance from the furnace and after an extended period of operation has yet to give trouble.

There is at present a large variety of casehardening salts available, ranging from straight sodium cyanide which is the least expensive in first cost to the more elaborate activated salts with cyanide as a base

lly
lar
ide
he
ep
her
om

ur-
ch
ist
ble
il,
ey,
er-
ce
ly
the
nd
n-
nd
on

oy
a
he
is
ey
a
il,
ne
en
a
all
a
ng
e,
ly
al
s,
ce
o-

y
e,
n-
in
li-
se

O
wil



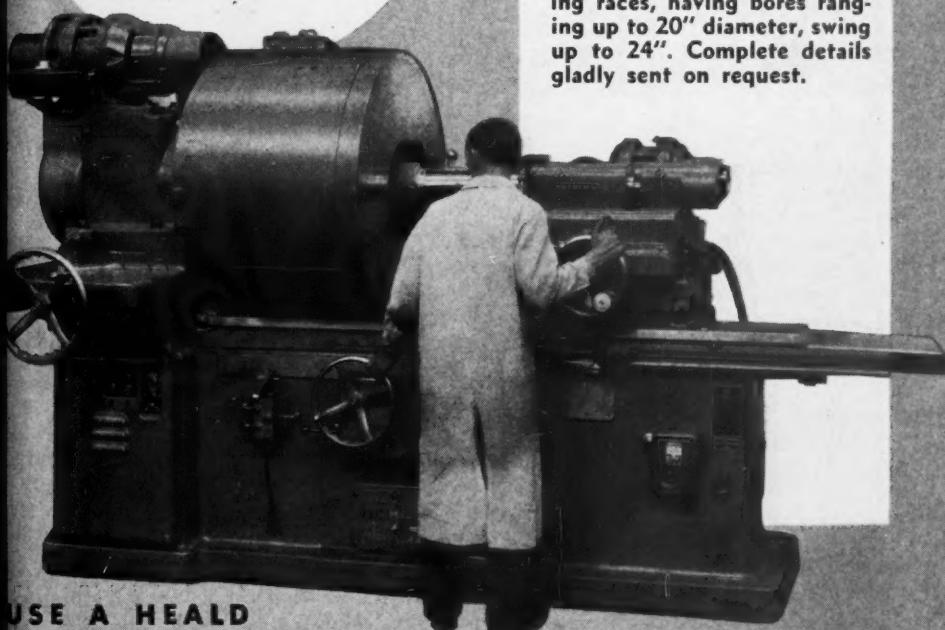
USE
FOR

THE

ONLY A BIG INTERNAL will grind your BIG jobs ECONOMICALLY

THE HEALD
No. 74

MAXIMUM DIAMETER HOLE—20"
SWING INSIDE GUARD—24"
TABLE FEEDS—0-18 FT./MIN.
WORKHEAD SPEEDS—50—200 RPM.
WEIGHT MACHINE NET—12000 LBS.



USE A HEALD
FOR PRECISION • PRODUCTION • PROFIT

THE HEALD MACHINE CO. WORCESTER, MASS.

HERE'S a big Heald Internal designed from the floor up to handle those big internal grinding jobs—a rugged, powerful machine that turns out large work faster and more accurately than would be possible with a lighter machine.

Unusually rugged throughout, from massive base to heavy duty workhead and wheelhead cross-slide, the No. 74 provides very desirable equipment for grinding such work as large gears, rolls, bearing races, having bores ranging up to 20" diameter, swing up to 24". Complete details gladly sent on request.

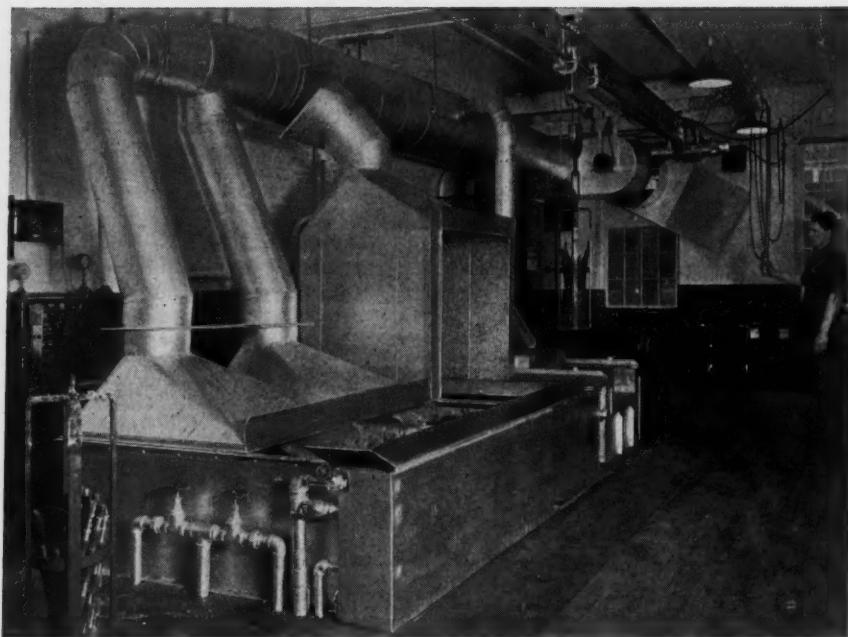


Fig. 4—A modern casehardening department. At the left is a single-purpose fixture designed for handling shafts in the bath, and another fixture of the same type can be suspended from the monorail. (*Photo courtesy Whitin Machine Works.*)

Each has a very definite place.

For a small pot installation to produce case depths up to 0.010 in., plain sodium cyanide is satisfactory. For the sake of economy, make up the original bath of the 45 per cent grade. The higher the original cyanide content, the faster it will depreciate during the first few hours of heating. If a bath of the 98 per cent grade is held at 1,550 deg. F. for a day, its cyanide content will drop to about 60 per cent. At the end of the second day it will be around 40 per cent, and at the end of the third, about 30 per cent.

A new bath of 45 per cent content will drop to about 35 per cent at the end of the first day and about 8 per cent lower the second. Since a bath

containing 20 per cent cyanide will do about all of the work that can be expected of the plain salt, it will be seen that in buying the highest grade materials you will be paying one-third more for a very minute difference in result. For "sweetening" the bath as it becomes depleted, it is best to use the 75 per cent grade or possibly the 96-98 per cent grade, since this higher grade has less of the inert ingredients, of which there are already enough present in the depleted bath.

For this same class of light case work, the so-called activated baths have been developed within the past several years. These bath will case economically up to about 0.018 in. in two hours at 1,600 deg. F. They usu-



MASTER Super Service RADIALS



In this new tool room, which is one of the largest and finest in the country, two Master Super Service Radials are installed. They are handling the drilling and boring of large automobile body dies with precision and efficiency. Such work is all within the range and capacity of these new 40HP Master Super Service Radials. They are built in sizes from 7' arm with 22" diameter column up to the largest size ever built having 12' arm and 26" diameter column.

Write for a full description of these remarkable machines.

8' and 10' Master Super Service Radials having 22" and 26" diameter columns respectively, and special bases to permit set-up and layout while drilling.

THE CINCINNATI BICKFORD TOOL CO.

OAKLEY • CINCINNATI • OHIO • U.S.A.

ally contain 35-50 per cent cyanide and are so compounded that not only will they carburize somewhat faster than plain sodium cyanide, but they may be used up to 1,650 or even 1,750 deg. F., at which temperature the plain salt will break down very rapidly.

One of the principal effects of this higher operating temperature is to considerably increase the carburizing speed. Some salts of this group are sold already mixed, while others consist of two compounds which are to be used in definite proportions at the start and during the life of the bath. Their manufacturers contend that this feature permits easier control of bath strength.

The third group of materials is the most expensive and is intended for use on case depths from about 0.018 to 0.062 in. They may be operated at temperatures up to 1,700 deg. F. In addition to deep case work, they are also recommended for shallower cases where the bath is heavily loaded as it is in many installations on production work. Like the preceding group, some are composed of two compounds, one of which provides a carbonaceous cover on the molten surface. This group is usually claimed to form carburized cases which closely resemble those produced by pack treatment; that is, they have less of the embrittling nitride structure which is sometimes found with straight cyanide.

After the proper salt for the required case depth has been decided upon, there are three factors which should govern the final selection. These are breakdown, drag-out and washing quality. If the quench is to be water, the last mentioned is not important, since any of the salts will wash off readily.

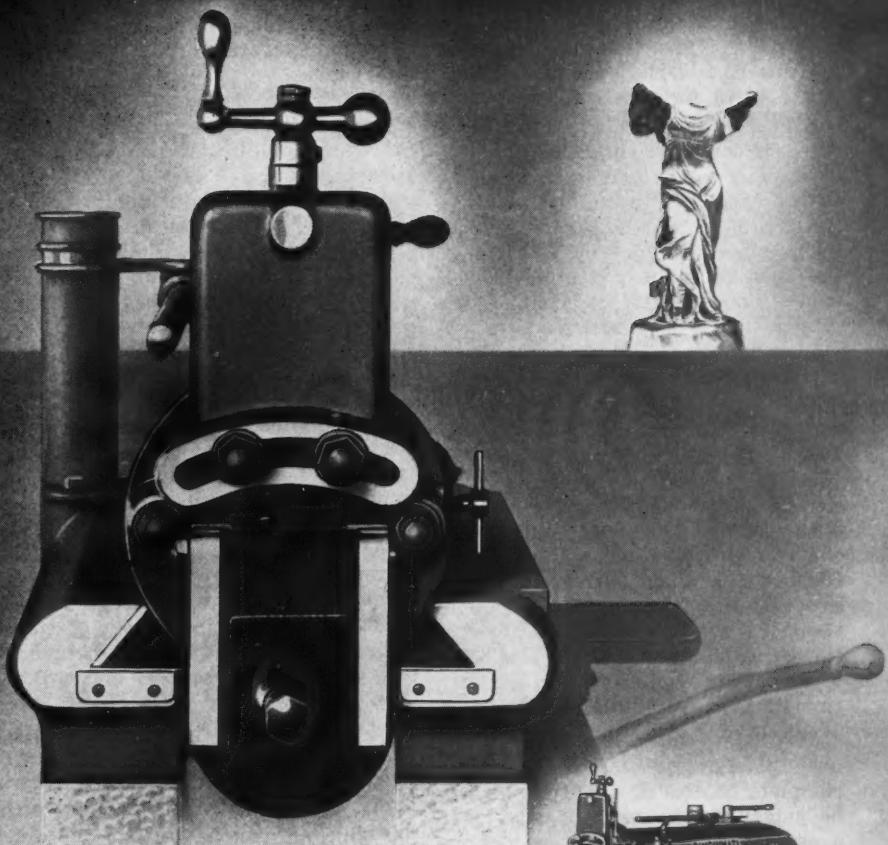
The breakdown of straight cyanide has been mentioned. It is by far the

most rapid in depreciation of the three types of material. Depreciation of the light and deep-case types which are composed of one compound will be about five pounds per day per 100 pounds of bath. Some materials will have slightly less, but with any of them the speed of breakdown will increase as the temperature goes up.

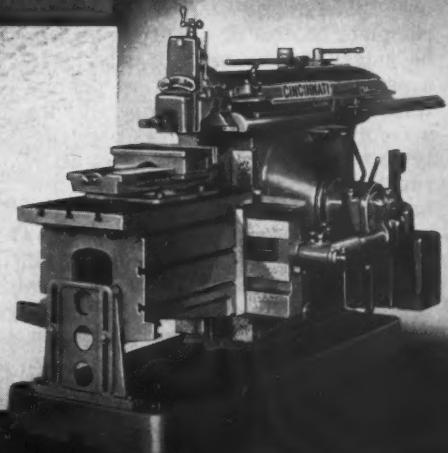
In some installations where the drag-out is particularly heavy, it may be sufficient to maintain the bath strength, but in most it will be found necessary to bail out a little occasionally to allow enough new salt to be added to keep it up. Most modern salts of the last two groups melt at a little less than 1,200 deg. F. and are therefore very fluid at operating temperatures. Little difference in drag-out can be detected between them under operating conditions.

Where small parts are hardened in baskets in baths which require carbonaceous covers on their surfaces, objections are sometimes raised since, as they are lifted out, some of the cover will be picked up and will adhere tenaciously, defying ordinary washing methods. This tendency may be reduced somewhat by carefully breaking up the crust before the container is lifted out. Some materials will wash off quite readily after an oil quench if the work is allowed to remain in an agitated, hot alkali bath for some time and will leave only a slight and easily wiped off oily film. Others in which a larger amount of barium salts are used will do better in a plain hot water wash. A few tests will determine whether the material on trial will wash off well enough for the purpose in hand.

Determination of case depth may be made roughly by breaking a sample, water quenched, if possible. Accuracy necessitates polishing the sample, etching with a 2 per cent Nital solution and examining micro-



Solid Ramways bring rigid cutting . . . long life and accurate performance to Cincinnati Shapers.



THE CINCINNATI SHAPER COMPANY, CINCINNATI, OHIO

SHAPERS

SHEARS

BRAKES

scopically. Magnification of 100 diameters will give a simple means of measurement, since one inch will indicate 0.010 in. case.

For bath casehardened work with cases of less than 0.025 in., the file is still the most common test, particularly where the parts are of such shape or size that they cannot readily be placed on the anvils of one of the several types of testing instruments. For scientific control the proper type of instrument is required.

Since the regular Rockwell Hardness Tester cannot be used satisfactorily on cases less than 0.025 in. deep, the Rockwell Superficial or an equivalent instrument must be used. On the Superficial, a reading of 90-92 with the 15kg. load will be just about the equivalent of file hard or 62-63 Rockwell C. This hardness may be expected in oil quenched work up to about 1½ in. in section. Larger sections will be found slightly less hard, while water quenched work may reach two or three points higher.

The strength of the bath is the one remaining factor necessary to complete control of quality, and may be judged by the depth of case given a sample by a treatment at definite time and temperature, compared with a record of similar samples previously treated, but by far the most accurate means is daily analysis of the bath. Using plain cyanide, analysis is straightforward, the cyanide percentage giving a direct indication of strength, but with the activated baths the figure obtained is not always the actual cyanide percentage. However, a standard method of analysis for cyanide follows which will give direct percentages when used with plain cyanide and an indirect figure or index when used with either the light or deep case activated salts. The in-

dex will be found to be somewhat less than half of the actual percentage of cyanide.

Weigh out one gram of a fresh sample and dissolve in about 100 cc. of water, distilled if possible. Heat this to about 150 deg. F., for a few minutes, being careful not to boil it. Continue until it is all dissolved with the exception of a little insoluble matter. Filter it into a second beaker, washing the filter paper five or six times with hot water.

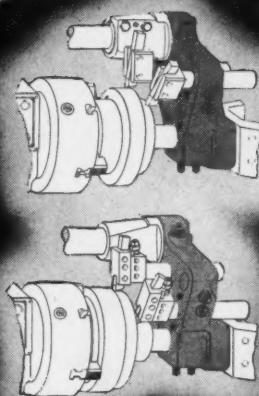
Titrate by dripping slowly into this solution a solution of 0.5 per cent normal Silver Nitrate held in a 100 cc. burette. Record the burette reading at the moment that the cyanide solution becomes definitely cloudy. Multiply this reading by 0.52 and divide by 2 to obtain the percentage of cyanide. To make the Silver Nitrate solution add 4.25 grams of Silver Nitrate to 500 cc. of water. This will make enough for a number of titrations. The only equipment needed is the burette, two beakers and a Bunsen burner.

As stated above, baths containing as low as 20 or even 15 per cent will give good results in the straight cyanide class, while in the activated group they will work well with a percentage index of 3-4 or about 10 per cent cyanide. It is to the user's advantage to run the bath at the lowest strength which will give consistently satisfactory results, since it will cost less to maintain. By the method of analysis given, this point can be found after a few day's operation.

The selection of suitable furnace and control equipment and the installation of adequate quench and washing facilities will enable the user to bath caseharden his work at low labor cost. With the proper salt for his application and the methods of con-

(Continued on page 82)

Do Heavy Duty Chucking Jobs Faster and More Accurately!



..you can—with the new Warner & Swasey **MULTIPLE TURNING HEADS**

By using this Multiple Turning Head with angle cutter holders and overhead pilot bar, combined turning and boring cuts can be taken at speeds and feeds up to the full capacity of your turret lathe.

Study the drawing above. Notice that reversible type cutter holders can be arranged so you can turn any two diameters (large and small, two small or two large) without cutter or holder interference.

The long, rigid shanks permit

**WARNER
&
SWASEY**

Turret Lathes

Cleveland

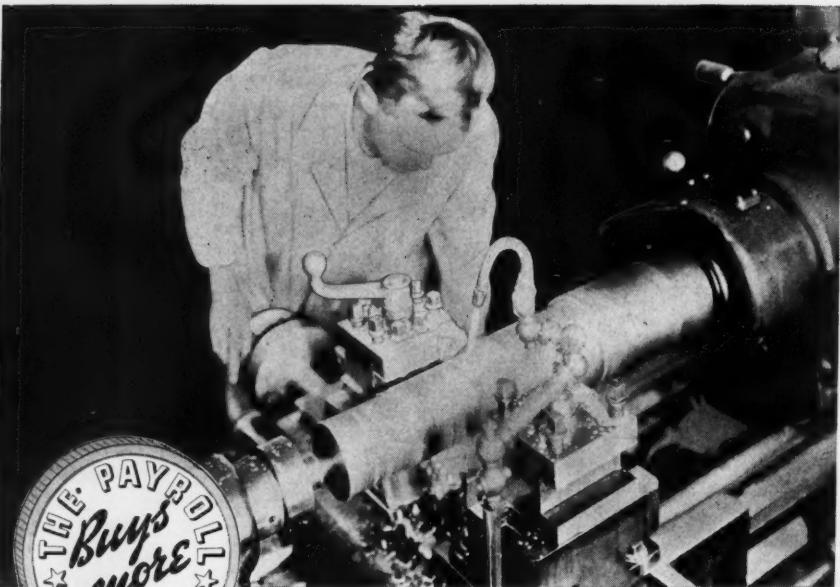


accurate turning of longer diameters. The large diameter shanks allow the cutter to be extended sufficiently to provide cross slide clearance for combined facing and turning cuts. Cutters can always be placed on center.

These features allow greater flexibility and closer accuracy when taking heavy cuts. Designed to handle maximum performance of high-speed steel, stellite or carbide cutters.

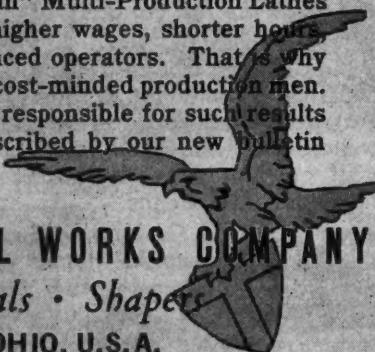
Let a Warner & Swasey field man show you how you can use these new Multiple Turning Heads—and other new and improved tools just developed by Warner & Swasey—to get better results from your turret lathes.

This new Tool Catalog and Manual
will be sent free on request.



... when "AMERICAN"
Multi-Production Lathes Are Used

HERE, for example, is an "American" in one of our most prominent shops actually producing four (4) times more work than the fairly modern machine it replaced. In hundreds of plants "American" Multi-Production Lathes are lightening the burden of higher wages, shorter hours, increased taxes and inexperienced operators. That's why "Americans" are the choice of cost-minded production men. The many productive features responsible for such results are clearly illustrated and described by our new bulletin No. 444.



THE AMERICAN TOOL WORKS COMPANY
Lathes • Radials • Shapers
CINCINNATI, OHIO, U.S.A.

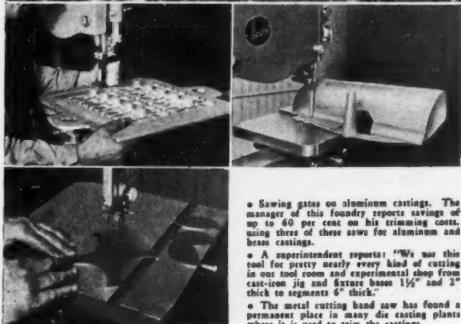
SO MUCH *For So Little...*

The Handiest Tool in the Shop

...for only \$88.95



No. 881 Metal-Cutting
Band Saw on stand,
without motor.



a. Sawing gates on aluminum castings. The manager of this foundry was saving \$1000 worth of gate 60 per month by his trimming cost, using three of these saws for aluminum and brass castings.

b. A superintendent reports: "We use this tool for cutting nearly every kind of casting in our tool room and experimental shop from cast-iron jig and fixture bases 1½" and 2" thick to sections 10" x 12" x 14".

c. The metal cutting band saw has found a permanent place in many die casting plants where it is used to trim the castings.

This Delta Metal-Cutting Band Saw is today being used for cutting aluminum castings and sheets, hard and soft cast brass, brass sheets and tubing, cast iron, copper, cold rolled steel, carbon tool steel, bronze and manganese, drill rod, high speed steel, monel metal, nickel steel, iron sheets and bars, malleable iron, babbitt, bakelite and other types of molded plastics, asbestos, slate, transite, pipe and countless other materials too numerous to mention. Shop superintendents in both small and large plants throughout the country are enthused over this remarkable metal cutting band saw. They cut everything on it from cast-iron jig and fixture bases 1½" and 2" thick to draw tie segments 6" thick. Users are enthusiastic about its economy, versatility, low power consumption and low upkeep cost.

SEND FOR BAND SAW CIRCULAR
giving full details and specifications on
the Delta Metal-cutting Band Saw.

**DELTA MFG.
CO.**

(INDUSTRIAL DIVISION)
659 E. Vienna Ave. Milwaukee, Wis.

DELTA MFG. CO., (Industrial Division)
659 E. Vienna Ave., Milwaukee, Wis.

Gentlemen: Please send me your new Band Saw Circular giving full specifications and details on the Metal-cutting Band Saw, and your new 1940 Delta Catalog.

Name

Address

City, State

New Machines for Molding Plastics

By BARTLETT WEST

RECENT months have witnessed the development of several new machines for molding plastics. Interest in injection molding, at present confined to thermoplastics which soften and remain soft as a result of heat application, has increased greatly and many of the new machines are intended for this type of molding. The new developments also include automatic or semi-automatic molding presses for use with thermo-setting plastics which are fluxed by heat and then hardened permanently as a result of chemical action within the mold. One such press has been offered to the molding trade generally and others have been built for restricted use.

All of the new machines to be de-

scribed here are substantially or completely self-contained units. Some are actuated by hydraulic and some by mechanical means, but all have one or more motors supplying the power for actuation and none are dependent on outside sources of high-pressure liquid for actuation, as is the case with most of the common forms of hydraulic press employed for molding. In general, heating is done electrically, but at least one of the machines is available in forms suited for heating by steam from an external source. One of the machines requires a supply of air under pressure to blow out the mold at one portion of the cycle, but is otherwise self-contained.

Most of the machines here described are designed for rapid production of parts of small to moderate size. This, of course, limits their utility, but, as by far the largest

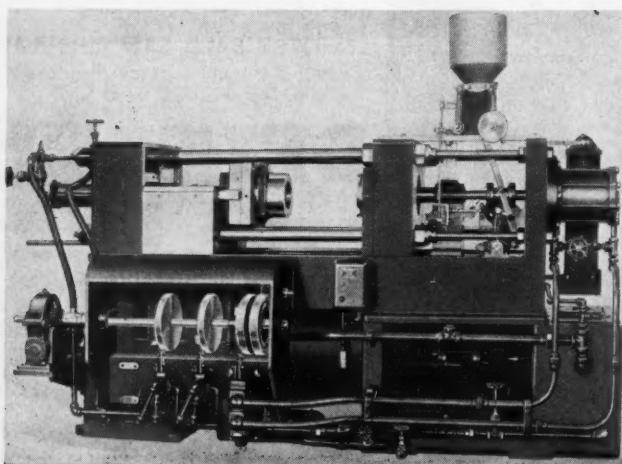


Fig. 1—Grotelite injection molding machine showing, at left, the rotating disks carrying dogs which can be set to operate the control valves automatically.

proportion of molded products are quite small in size, there is a large market for their output. In general, also, the molds used are relatively small in size, although many of them are provided with multiple cavities. This type of design has a tendency to reduce mold costs, especially as compared with very large molds, the latter often made with a score or more of cavities so as to increase the output in a cycle which is rather long. With low mold cost, it is feasible to mold many parts which it would not be economical to mold otherwise, especially if the cycle can be shortened and labor charges reduced. Thus a short cycle with minimum attention from the operator is an important objective in most of the new designs.

Injection molding with thermoplastics is similar in general principles to die casting, and some of the machines produced have borrowed from die-casting practice. There are, however, important differences both in the machines and in the characteristics of the materials used. In die casting, the metal is usually in liquid form and is easily forced into the mold. In injection molding it is not feasible to reduce the material to a liquid form. It must remain in the form of a highly viscous or dough-like mass until injected and the process of injection therefore requires extremely high pressures, usually on the order of 20,000 lb. per sq. in., whereas the die casting of liquid metals is seldom done at pressure

above 2,000 lb. per sq. in., although machines for die casting brass and some other metals in semi-liquid or partly solidified form also use pressures on the order of 20,000 lb. per sq. inch.

In both injection molding and die

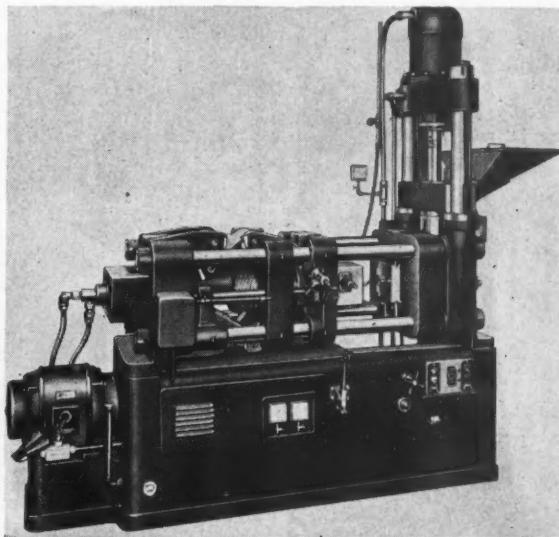


Fig. 2—General view of the Lester injection molding machine, showing, at right, the vertical ram by which plastic is forced into the mold, the latter being shown in open position.

casting, the dies are kept cold or cool, are rigidly locked during the injection period, and are opened as soon as the injected material has cooled enough to hold its shape. Methods for locking and moving the dies are identical in some designs of die casting and of injection molding machines. It is not possible in the present state of the art, however, to do the complicated core work in injection molding that is often done in die casting.

Considering new specific designs of injection molding machines, one of the latest is that produced by The Grotelite Company and shown in ac-

companying illustration. Molds are made in two parts, the front half being bolted to the fixed front head of the machine and the rear half designed to slide on ways independent of the tie bars. Actuation of the mold is entirely hydraulic, but after

quickly. The injection ram is then withdrawn, the mold is opened, and ejection pins force the molding or moldings from the mold. Heat is applied to the outside of the injection cylinder by "Calrod" units arranged in a circuit with voltage control on a thermostat which maintains close regulation of temperature. The "Calrod" units are cast into a split sleeve which is arranged for quick removal from the injection cylinder. Provisions for changing the latter quickly are also made.

This machine is provided with a two-stage Vickers vane pump. Valves are operated by slowly rotating motor-driven discs having dogs which can be set to time each part of the cycle precisely and automatically to meet required conditions. The plastic used is generally cellulose acetate supplied in granular form and fed automatically from a hopper in required quantities to replace the supply injected. The plastic falls into the injection cylinder when the plunger is withdrawn and is heated in its gradual passage through the cylinder, which is of stainless steel.

In general principles, other injection molding machines are similar to that

just described, but they differ in structure, arrangement of parts and many other details of design. A relatively new machine is one of Lester design, marketed by the Index Machinery Corporation. An outstanding feature of this machine is the use of a vertical injection ram which makes possible a shorter machine and reduces floor space required. In this machine, the rear

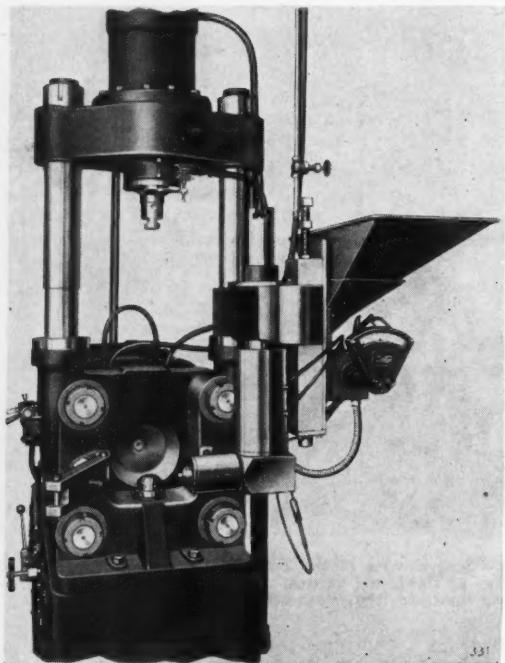


Fig. 3—Close view of the injection end of the Lester machine. The injection cylinder and nozzle with their heating jackets can be swung back for ready access to these parts.

the mold is closed it is locked by a wedge moved vertically by a separate hydraulic ram, locking thus being made independent of the main actuating ram.

Subsequent to closing the mold, the injection cylinder is brought into contact with the front half of the mold and the injection ram is advanced, forcing the heated plastic into the mold, where it hardens



For continuous service in airplane, automobile, sheet metal working and other production plants there is no better $\frac{1}{4}$ " Universal Electric Drill than CP No. 846. It's a tool that you can buy with confidence, for continuous use on the most severe operations.

Check the features of CP Universal Electric Tools...high torque, high powered.

cool-running CP universal motors...100% ball bearing construction...heat treated helical gears. You'll quickly realize that CP tools are production tools.

Catalog No. 899 tells the full story of CP Universal Electric Tools and gives essential data on all models.

Send for a copy

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 6 EAST 44th STREET, NEW YORK, N. Y.

SALES OFFICES AND SERVICE STATIONS THROUGHOUT THE WORLD



UNIVERSAL TOOLS

DRILLS • SCREW DRIVERS • NUT RUNNERS • TAPPERS • GRINDERS • SANDERS

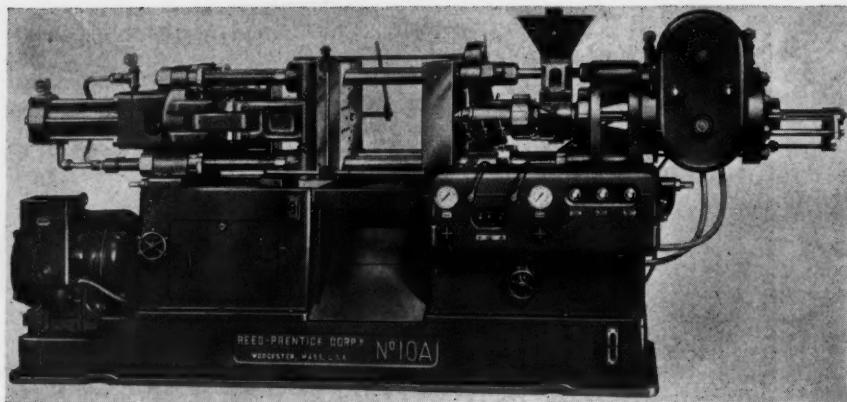


Fig. 4—Latest design of Reed-Prentice injection molding machine, showing injection parts and controls at right and the toggle actuating mechanism for moving and locking rear half of die at left.

half of the mold is moved on tie rods, acting as ways, by means of a screw and when the mold is closed it is locked by a toggle mechanism. Construction is such that the injection cylinder and the injection nozzle attached to it can be swung out to facilitate access to it. Heat is provided electrically, there being one unit surrounding the injection cylinder and another surrounding the nozzle at right angles to it.

Timing of the cycle is effected by electric time clocks which, of course, are supplemented by push-button and hand controls, although automatic operation is provided for, including the feeding of the plastic from a hopper. The Vickers pump provided is driven by a 10 h.p. motor.

Another relatively new machine, and one which has gained extensive use, is produced by Reed-Prentice. This machine is similar in some respects to those of the same make furnished for die casting of metals, especially in regard to the device for opening and closing dies. This mechanism includes an hydraulically-operated toggle which constitutes

the locking means. Injection is accomplished hydraulically, as in other machines, but using a horizontal cylinder.

Heating in the latest model is by electric induction coils surrounding the injection cylinder, a new departure in injection molding machines. Both the injection cylinder and its ram are given a nitroalloy treatment, whereas on other machines chromium plating or stainless steel are employed. A Vickers pump and valves are used and are arranged for electric control from clocks set to determine the duration of various phases of the cycle. Although a 15 h.p. motor is employed to drive the pump, its full power is required for only 2 seconds during the injection, half this power being sufficient at other times.

Another and quiet recent design of injection press is that known as the H-P-M Model 25, produced by Hydraulic Press Mfg. Co., and developed from earlier models to which it is similar in many respects. In this press, the dies are moved and locked by hydraulic means only, the sup-

-
- ✓ BETTER Machinability
 ✓ GREATER Uniformity
 ✓ SMOOTHER Finish
 ✓ HIGH Corrosion Resistance

... with parts made of

*REZISTAL Free-Machining STAINLESS

You'll experience better results when you specify REZISTAL FREE-MACHINING for your stainless parts jobs . . . and there's big reasons why REZISTAL FM-188 and FM-2 bars are produced on Crucible's Tool Steel Mills—by Tool Steel Craftsmen. Accurate metallurgical control assures uniform steels—lot after lot.

In terms of your production needs, this uniformity in analysis and bar size spells easier machining, tool economy and better, faster work! Add to this the basic factor of improved corrosion resistance—and you have the answer why hundreds of metal working organizations prefer REZISTAL FREE-MACHINING grades and are drawing on our stocks from coast-to-coast!

You'd like the smoother finish of parts made with these bars. So why not test for yourself on your next job. Order some bars from our nearby branch—FM-188 for regular machined parts—FM-2 when higher physicals by hardening are desired.

For handy stock size reference, write today for the latest REZISTAL STAINLESS STOCK LIST SS-52. No obligation, of course!

*Reg. U. S. Pat. Off.



CRUCIBLE STEEL COMPANY

CHRYSLER BUILDING • 405 LEXINGTON AVENUE • NEW YORK CITY
BRANCHES, WAREHOUSES AND DISTRIBUTORS IN PRINCIPAL CITIES

of America

CONSULT TELEPHONE DIRECTORY OR
THOMAS' REGISTER FOR NEAREST OFFICE

MAKERS OF HIGH SPEED, TOOL, STAINLESS, ALLOY,
PRODUCTION AND SPECIAL PURPOSE STEELS

porting heads being guided by the tie bars which act as ways. Injection is also accomplished hydraulically, much as in the other machines described, but heating, although done by electric means, is not applied by such means direct to the injection cylinder. The heat is first trans-

ferred to oil, which is then piped to the injection cylinder where its heat is transferred to the plastic, after which the oil is recirculated through the electric heating unit. This arrangement is claimed to facilitate the desired control of heat. Electric controls for automatic operation of the machine are provided.

In addition to the machines described above, all of which are of American make, many imported injection molding machines are in use in America. The machine known as the Isoma has gained rather extensive sale. In this machine, which has a rather small capacity, the molds are opened and closed by gearing which actuates a toggle mechanism for locking, a separate motor being used for this purpose. The injection ram in this machine is also operated mechanically through gearing and a heavy spring. Each function of the machine is controlled by electric timing devices and heating is also done by electric means.

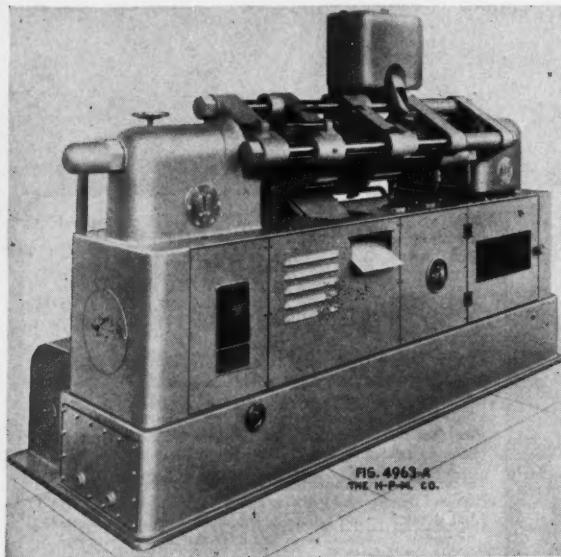


Fig. 5—H-P-M injection molding machine designed entirely for hydraulic actuation. The pump and control valves are enclosed in the base.

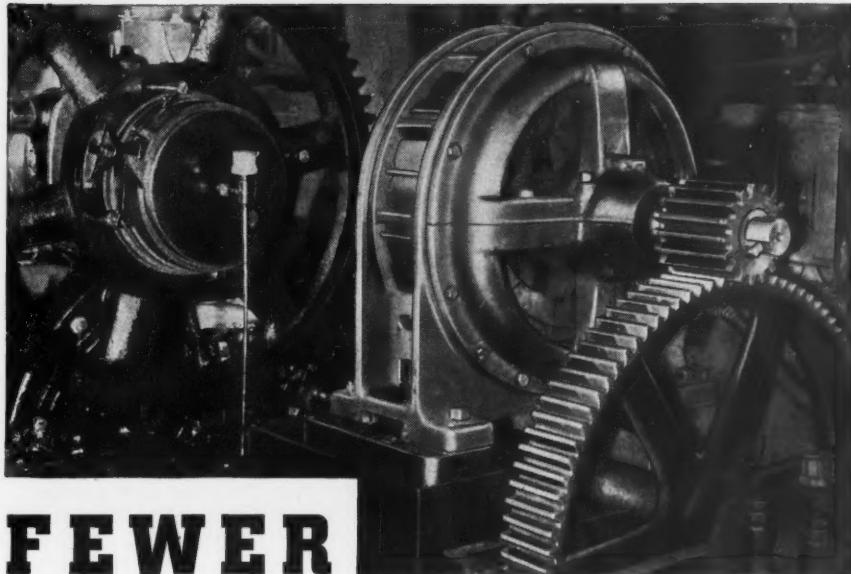
ferred to oil, which is then piped to the injection cylinder where its heat is transferred to the plastic, after which the oil is recirculated through the electric heating unit. This arrangement is claimed to facilitate the desired control of heat. Electric controls for automatic operation of the machine are provided.

This machine is equipped with a variable-stroke H-P-M radial pump acting in dual "OH system" circuit and serving both the injection ram and that employed for locking the molds. Space is provided for molds

of 10-in. diameter. Two larger sizes of this machine of the same or similar design and one having die space 24 x 24 in., have been announced as in preparation.

As will be seen, there is a degree of similarity in all the injection molding machines, although they vary in many details of design. Their use is limited to thermoplastic materials, as a thermosetting type of material would be likely to harden in the injection cylinder and nozzle and, even if it did not do so (by keeping it below reaction temperature), it would be necessary to add heat for curing in the mold, whereas, with thermosetting materials, the mold can be kept cold and hardening will result from this cooling action.

Most injection machines are limited in capacity to 3 to 4 oz. or less of



FEWER REPLACEMENTS—Just One Advantage of G-E Fabroil Gears

HUNDREDS of manufacturers have reduced their replacement cost appreciably by specifying G-E Fabroil gears to transmit power to their machines. But reduced maintenance is not the only benefit Fabroils provide!

Because they are nonmetallic and contain a high degree of resilience, Fabroil gears are extra-quiet and cushion the shock of heavy machinery. This helps reduce vibration to the minimum and at the same time increases the life of your machine.

Write your nearest Fabroil gear distributor listed in Thomas' Register, or to Section H-49, Plastics Dept., General Electric Co., Pittsfield, Mass.

GENERAL  **ELECTRIC**

PD-33D1

plastic per cycle and by the rate at which heat can be applied to reduce this material to a plastic form suitable for injection, but at least one machine (Lester) claims a capacity of 6 oz. In general, however, the length of cycle is rarely less than 10 sec. in duration and at this speed the quantity of material injected is small.

Few machines can apply heat sufficient to adequately soften as much as 6 oz. of plastic a minute, as excessive temperatures may "burn" or discolor the plastic—which is, itself, a poor conductor of heat. For the class of work usually undertaken, however, the capacities named are adequate, especially as the cycle is often slowed in any case by the time required to place inserts, when these are specified.

As already indicated, the problem of automatic molding, though not insoluble, is beset with difficulties even when thermoplastic materials are employed. All of the machines mentioned can be operated automatically and sometimes are allowed to operate in this fashion, but they require considerable supervision. One molder seldom can care for more than one or two machines, and a single machine often requires his entire attention. With thermosetting plastics, most of which range in price from about half to about one-fifth as much per pound as the usual thermoplastic, a different and in some ways a more difficult set of conditions must be met to achieve automatic molding. They are met for certain moldings of small size, however, by a machine offered by the F. J. Stokes Machine Company.

This machine is somewhat more like a conventional molding press but the design involves many departures to make it self-contained and automatic in operation. Molds are placed

with the parting plane horizontal and in general are arranged for electric heating, although modifications for more conventional steam heating are possible.

The usual hydraulic actuation, however, is dispensed with and a system of worm gearing is provided in conjunction with an electric motor to close and open the molds and to apply the required pressure while they are closed, the latter being sustained by the reaction of a pair of heavy coiled springs which are compressed when the mold is closed. These springs also limit the total pressure which can be applied to the mold and add a safety factor which is desirable in an automatic press.

Filling of the mold is accomplished by gravity, the molding material being fed from a hopper through a metering device set to feed the required quantity. This is important, as in this type of molding the mold is necessarily open while being filled. When the plastic is in place, the mold closes automatically, opens for a short "breathing" soon after closing, closes again and remains closed until the cure is complete and then opens to eject the piece or pieces molded. The latter drop through a gate arranged to automatically stop the press should any failure to deliver properly occur. The mold is then blown out automatically by compressed air and is ready for another cycle.

Each event in the cycle is timed initially in setting up the press, and controls of an electric type are set accordingly to time the events of subsequent cycles automatically. When so set, molding may be continuous for 24 hours a day and is said to require only such supervision as is needed to keep the hopper filled with plastic.

Mold temperature is maintained



LUFKIN

**MICROMETER DEPTH GAGE MEASURES
IN THOUSANDTHS FROM 0 TO 6 INCHES**

Each gage is provided with six rods. Each thousandth is numbered for quick, accurate reading, and the exclusive, patented lock nut locks rod at any point to maintain reading. The five inch base is hardened and ground and has knurled surface on top affording firm hold. This is without doubt the finest depth gage made.

BUY THROUGH YOUR DISTRIBUTOR

NEW YORK
106 Lafayette St.

THE LUFKIN RULE CO.
SAGINAW, MICHIGAN

Canadian Factory
WINDSOR, ONT.

substantially constant by thermosetting means. It is likely, however, that some supervision would be given with reasonable frequency in almost any molding shop, as it would seem to be impossible to guard with certainty against production of imper-

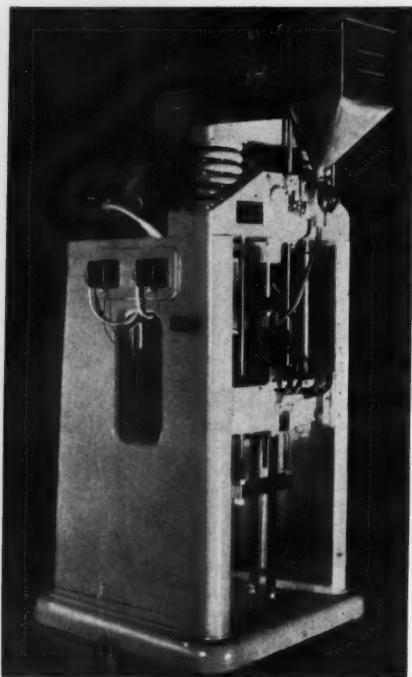


Fig. 6—Stokes press for automatic molding of thermosetting materials, the latter being fed from the hopper at top. Actuation is by worm gearing, the heavy coil springs being compressed to maintain pressure on the mold when the latter is closed.

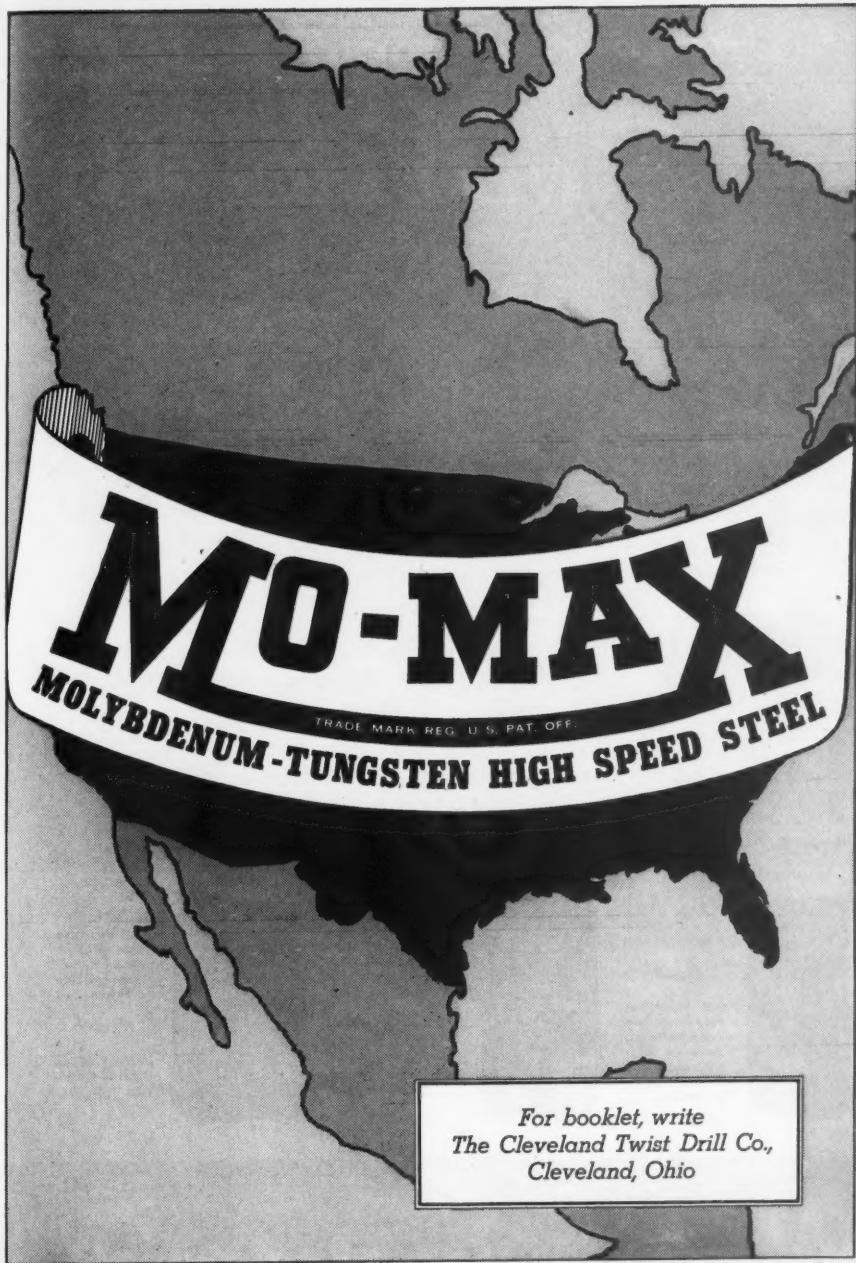
fect pieces, perhaps in considerable quantities, if this were not done. Nevertheless, the press appears to have accomplished much in the direction of automatic molding and its use may introduce economies in labor and a degree of uniformity in product not easily attained by usual means.

An objective in this, as in injec-

tion molding presses, is to reduce mold costs and labor charges to an extent not realized otherwise. Parts molded are small, being limited in diameter to about 3 in. and in volume to a size of molding which can be made with about 5 cu. in. of molding material. With this press, it is contended that many parts can be produced economically which cannot be produced at all otherwise at a cost warranting the necessary investment in molds. Small molds requiring a normal cycle of handling are not economical in labor and if the number of cavities is increased to get a low labor cost per piece, the mold becomes unduly expensive. It is contended that this press overcomes these drawbacks and that it can be used with economy in the production of parts required in lots up to about 25,000.

None of the molding equipment here described has succeeded in displacing very much equipment of more conventional form. It has served rather, in most cases, as a supplement to existing types, being more economical in some instances and less economical in others. In still others it is not applicable at all. It may be said, however, that steps toward making molding automatic, or more nearly so, are promising and are likely to lead in time to a more general use of this form or of other forms having a similar objective. There appears to be little likelihood, however, that conventional molding methods or equipment will be displaced entirely unless radically different plastics become available or ways of producing them at much lower cost are developed.

By mentioning MODERN MACHINE SHOP, when writing to advertisers, you are helping to build a bigger and better magazine for your own use.

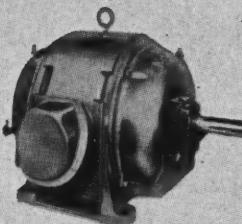


October, 1939

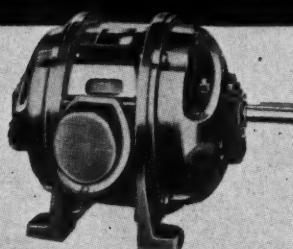
MODERN MACHINE SHOP 69

8291

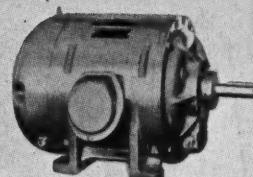
TO DO THE JOB THE ONE BEST WAY



Splashproof enclosure



Westinghouse General Pur-
pose Motor—the workhorse
of industry



Totally enclosed, fan cooled
enclosure



Westinghouse gearmotor
for slow speed machines

Modernizing with the
right motor and con-
trol justifies itself in

savings



Westinghouse fractional
horsepower motor



Combination
Linestarter

Saves

lost production
time due to fuse
replacements...
combines mag-
netic starter and
fusless circuit
protection.



Westinghouse
Safety Switch
Diamond Pointed
Break Jaw and
extended blade

Saves

dressing down,
saves main-
tenance expense.



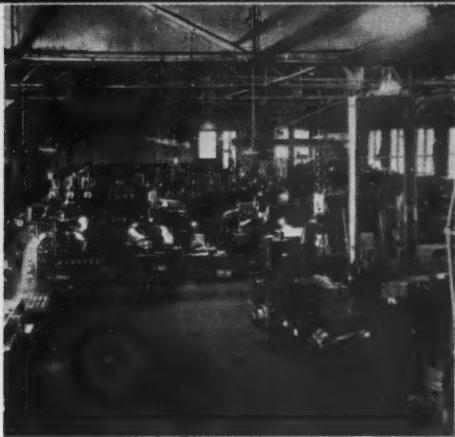
Westinghouse
Motor Watch-
man... Manual
Starter for Small-
er Motors

Saves

in First Cost...
Saves in Opera-
tion.

Westinghouse





Maintenance Costs in this Machine Shop Cut 75%

As part of a complete plant modernizing job, an eastern glassware company took stock of its motor and control performance. They found that motor maintenance alone was costing over \$2400.00 a year.

Motors placed near the molding machines were the greatest source of expense, due to the fact that windings were exposed to hot oil fumes. Bearings on motors near batch mixers seldom lasted more than a year.

Westinghouse modern fan-cooled motors, totally enclosed, solved both problems, cutting maintenance expense 75%.

Make sure that you are not overlooking opportunities to save money in your production line with modernized equipment. Let a Westinghouse representative show you how improvements in complete electric drives justify their installation in dollars saved.

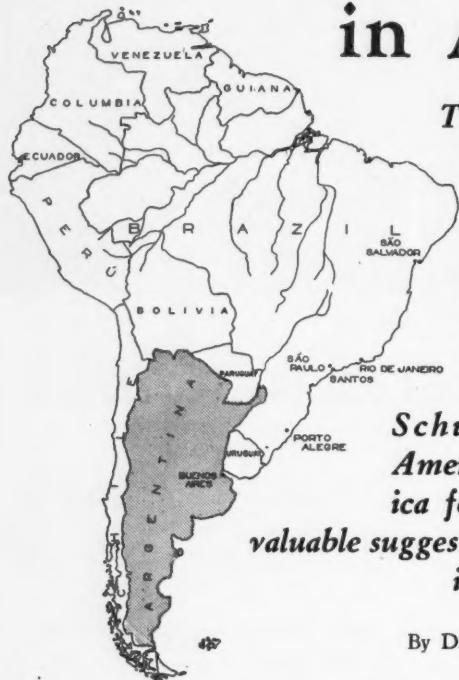
WESTINGHOUSE ELECTRIC & MANUFACTURING CO.

/ There is a Westinghouse electrical wholesaler, industrial agent, or district office in all principal cities

J-90151-A

Motors and Control

What About Business in Argentina?



The events of the past several weeks have supplied plenty of reason for American businessmen to take stock of their relations with the businessmen of other countries in our own hemisphere. Dr. Walter P. Schuck, who has represented American firms in South America for many years, offers some valuable suggestions on transacting business in Argentina.

By DR. WALTER P. SCHUCK
Buenos Aires

ARGENTINA is not the largest South American country, but it is the South American country with the greatest purchasing power. Buenos Aires, capital of the country and with a population of three millions, is proud of the high character of its import trade and general trading facilities. Argentina has treated her long-term creditors fairly, and there are many American firms maintaining commercial relations with Argentine businessmen in a highly satisfactory manner.

To be true, certain import restrictions have been imposed which have

hit American trade with Argentina, but it is an easy guess that the new American ambassador, Mr. Armour, will pave the way to a better understanding. It is certainly not true that Argentines cannot do without many of the things which seem necessary to every-day life in the United States, but with Europe engaged in war and its manufacturing facilities devoted to war materials, Argentina will constitute a ready market for machinery for its rapidly-developing industries. Thus there is plenty of room for American newcomers.

Unless they already have business connections in Argentina, however, American firms who are considering entering the Argentine market should start with two fundamental convictions; (1) that they must learn how to do business in the Argentine market before they start, and (2) that reliable and practically useful information cannot be obtained free. They will find that the securing of dependable information will involve expense in one way or another.

That statement might be true for any market, but it is particularly true of Argentina. In practically every case where business has proved disappointing for a newcomer, the reason can be traced to a blank ignorance of the market. Books dealing with conditions and requirements in the Argentine are hard to find, and when found are likely to be out of date due to the fact that conditions there change so quickly. Even these few paragraphs can give but a general idea of the course to be followed in order to obtain the necessary information.

First-hand information is, of course, the best, but the manufacturer who visits Argentina to obtain his own information and make his own contracts should plan to make a good job of it. The person who arrives on the Wednesday steamer and tries to find out "all about the market" in a two days' run around to the Consulate, the Commercial Attaché, the Club, American banks, and individual firms will leave the country Friday night with a fund of generalities instead of the precise information he needs. Yet there have been dozens of would-be exporters who expected to "make" Argentina in two days. And there have been others who dropped the whole idea of getting into Argentina business when they heard about form require-

ments and "red tape."

It was a London manufacturer who, upon being informed regarding the paper work connected with transacting business in Argentina, bluntly withdrew from an important transaction because, as he said, "he would not like to be fined for overlooking one of the numerous instructions." But many Americans feel the same way without considering that red tape has become standard equipment which goes with any export order to any country in these days.

Argentine imports are controlled by the government with a view to securing an export surplus sufficiently high to cover the debt service. Import permits for a number of American articles—in fact, about 700 items—are generally denied, but machinery is in most cases admitted without difficulty. Once the import permit has been granted, the American exporter has no further trouble in getting, through the importer, the foreign exchange allotted by the control office. At present most American-manufactured articles can be paid for only at "free" rates. The "free" dollar rate has for many months been about 432 pesos for \$100 as against the "official" rate of 363 pesos for \$100.

As a consequence of the high dollar rate in the free market, American goods are automatically 20 per cent more expensive, in pesos, than most European products including British, German, and Swiss. As a matter of fact, goods from practically all countries excepting the United States, Japan, and Canada can be imported at the cheaper "official" rates, besides which the import permits for goods from those other countries can be obtained easier and quicker. That fact would seem, of course, to be a good reason for pessimism regarding sales possibilities

in Argentina, but such pessimism is actually not justified in the matter of machinery.

To begin with, some American products are admitted practically without restriction and at the cheap "official" rates. This is true of agricultural machinery. Furthermore, Argentines are prepared to pay a bit more for American machines, which they consider to be more up-to-date, more practical, and more economical than machines of European make. Finally, the situation may change at any time—as soon as Washington and Buenos Aires come to an agreement regarding foreign trade facilities.

Aside from the considerations enumerated above, those who think that Argentine business is uninteresting due to import difficulties are making a mistake. Lack of desire or aggressiveness, coupled with a lack of knowledge, are undoubtedly responsible for the majority of the set-backs experienced by American manufacturers.

It is sheer nonsense to expect Argentine buyers to cheer at the sight of an American product. British importers have for two generations insisted that Argentine buyers come to their offices instead of taking it upon themselves to go to the offices of the prospective buyers. That attitude is the reason why sales of British goods have dwindled in many parts of the world, and Argentina is no exception, in spite of the far-reaching influence of such British concerns as the railroads.

Especially in the machinery trade, England fights a losing battle against German prices and American quality. In this trade, however, Americans also have to face the terrific competition of the Germans. It is true that more recently the Argentines are more reluctant to give their busi-

ness to a nation which has more or less openly fostered rebellion in the southern provinces of Brazil and Argentina, but such feeling will be only temporary whereas German propaganda is continuous and American propaganda is non-existent.

Large advertisements of American products are often seen in the Argentine papers—advertisements which are probably better and costlier than those of German firms have ever been. British firms do little advertising, relying almost exclusively on "connections." But nothing is done by the American community to create or foster pro-American sentiment in business. It would be so easy—just to present one example—to remind Argentine purchasers that they cannot expect to obtain spare parts for German machines in time of war, but that American firms will always keep their patrons supplied with everything they need in this field. However, no use is made collectively of this splendid opportunity for developing trade relations, whereas the Germans use the most insignificant strike or lock-out in the States to paint a gloomy picture of "American crisis" and "American unreliability."

European commercial aggressiveness is expressed in other ways, also. At the moment, Switzerland is preparing an interesting display of Swiss products to be opened to the Argentines in October, whereas the only exhibition that has been sponsored by the United States is an exhibition of American books. The educational value of the books cannot be denied, but such an exhibition is not especially interesting to the businessman. Moving pictures of American industrial plants and American manufacturing methods and production lines should be shown upon occasion, in order to counteract as far as possible the bad effects of the Hol-

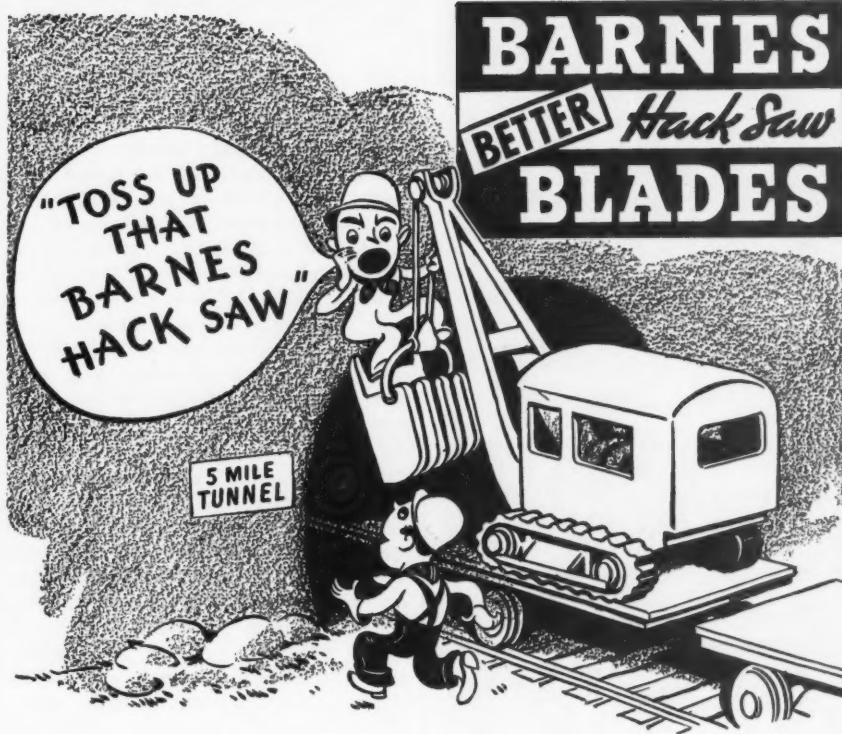
or
the
Ar-
only
pa-
can

can
en-
ch
an
ver
per-
on
ne
re-
nt

ey
ts
ar,
ys
th
d.
ly
e-
nt
o
n
"

f

e
-
t
-



If the plight of these boys reminds you that Barnes makes good hack saw blades, they will have served their purpose well.

Barnes Blades are sold through selected distributors who always sell the particular type of Barnes Blade best suited for the cutting job to be performed.

Seek out your Barnes distributor, follow his recommendations and watch your cutting costs go down.

W. D. BARNES CO., INC.
DETROIT, MICHIGAN



- The Finger Tip Control centralizes all controls in one panel for ease and speed of operation.

Cross traveling movement equals width of table and standard wheel overruns table one-half of its width in front and back. Self-contained motor drive and motor driven coolant system. Write for catalog GL108.

Gallmeyer & Livingston Co.
308 STRAIGHT AVE., S. W.
GRAND RAPIDS, MICH.

lywood products which feature divorce, rackets, holdups, and so on. Such pictures may be popular, but they are certainly bad propaganda for the United States and Americans.

The American firm that is considering the possibility of exporting machinery to Argentina should first learn whether or not competitive products are already available in the Argentine market, and if so, by whom and at what prices. With these facts in hand, it is a simple matter to concentrate upon a special item or special feature and emphasize the superiority of such item. The next step, however, is to obtain the services of a good representative in the Argentine territory.

The Argentine representative should first have all the qualifications of a competent salesman, and should speak Spanish fluently. Further, he should be familiar with the Spanish-American way of saying "yes" and "no." A good representative is almost a guaranty for satisfactory business from the start; consequently the manufacturer should make every effort to make a connection with exactly the right person or firm. Every care should be taken, otherwise the manufacturer runs a chance of taking on a representative who may do more harm than good. There are many firms of representatives—and large ones, too—which will take any representation offered, and this is particularly true of non-American firms all over South America. But whether the firm will make an effort to find prospects and make sales, or whether it accepts the American representation in order to eliminate that firm as a potential competitor for European firms which it is already serving as a representative is another question.

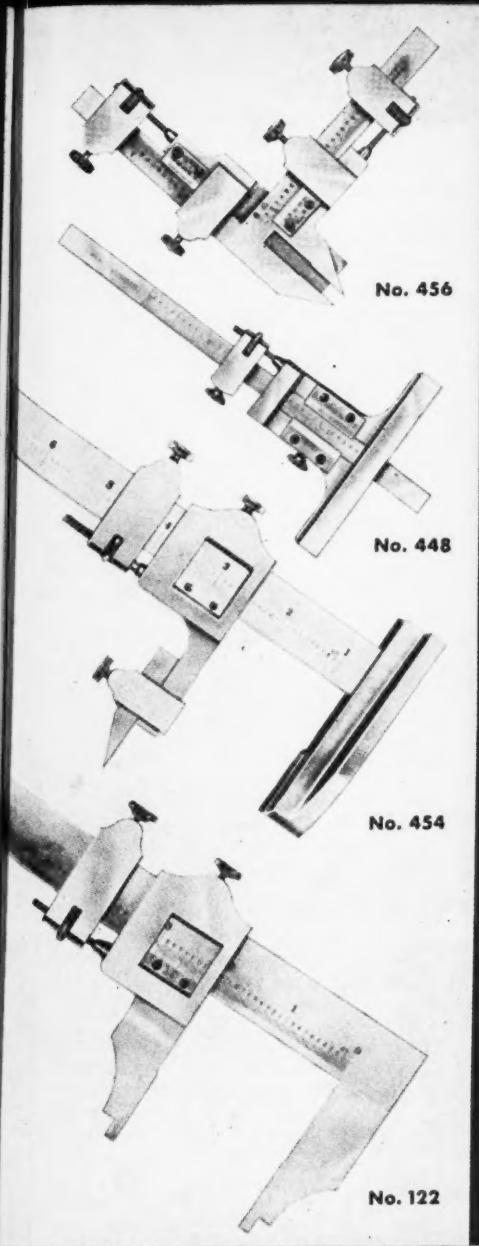
From my own experience I should like to state that it is possible to

di-
on.
but
anda
ceans.
nsid-
ma-
first
tive
the
, by
these
atter
item
the
next
serv-
the

tive
sions
ould
, he
nishi-
and
al-
tory
ntly
very
ex-
very
the
tak-
y do
are
-and
any
s is
ican
But
ffort
, or
rep-
that
for
eady
an-

ould
e to





for accuracy plus

STARRETT VERNERS

The accuracy of Starrett Vernier Height Gages, Depth Gages, Calipers, Gear Tooth Calipers, Dovetail Calipers and similar vernier tools goes without question. But along with unfailing accuracy, Starrett Verniers give you the perfection of design and finish that is essential with precision tools of this type . . . which is why you'll find that Starrett Verniers are standard equipment in the best shops wherever you go. For a description of the complete line of Starrett Precision Tools, Dial Indicators and Hacksaws, see Starrett Catalog No. 26 MD. A copy free on request.

THE L. S. STARRETT CO.

World's Greatest Toolmakers
Manufacturers of Hacksaws Unexcelled
Steel Tapes, Standard for Accuracy
Dial Indicators for Every Requirement
ATHOL, MASS., U.S.A.

Standardize on
STARRETT TOOLS
BUY THROUGH YOUR DISTRIBUTOR

prepare a full market report based on research and experience as a preliminary, before a representative of an American firm visits the country. This research report should cover sales possibilities for products which up to now have not been sold in the Argentine market—a very important item in the case of machinery as Argentine industrialism is still in its infancy.

Only after the American manufacturer or exporter has made sure that sales possibilities for some of his products exist should he look for a representative. The representative should be contracted personally by the export manager of the American firm or one of his assistants. It might be sufficient to rely upon another's judgment in contracting a representative in France or Sierra Leone; everyone knows everyone in French business circles, and Sierra Leone is

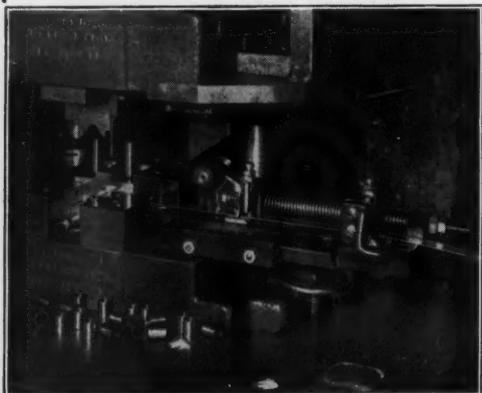
certainly of minor importance. Argentina is different.

Dun and Bradstreet's report and a bank reference are not enough. At least so far as selling in South America is concerned, there is no substitute for experience. Very much must be left to the representative's discretion; he must know when to stand firm and when to recede; when to order stocks and when to reduce stocks; when to fight a competitor and when to share the business with him; when to grant credits and when to refuse them.

A trip to South America is usually considered much nicer, from the tourist's point of view, than a trip to Europe, but unfortunately is still much more expensive. However, if he can plan to stay a week at Rio de Janeiro, another week at Sao Paulo, one or two days in Montevideo, and ten days in Buenos Aires, he may

DICKERMAN HITCH FEED

For Quicker Set-ups on Short Runs
Accurate - Economical - Adaptable



The Hitch Feed is adaptable to any ordinary punch press without press alterations. It is built to feed from any position on any style die.

In cases where the Hitch Feed is permanently attached to the die-set, the set-up time of the die and Hitch Feed is no longer than that of the die alone.

Left: Dickerman Hitch Feed mounted in the usual right-hand position feeding a cut-off-and-form die.

Write for folder No. 84.

**H. E. DICKERMAN
MANUFACTURING CO.**
284 WILBRAHAM RD.
SPRINGFIELD • MASS.

Ar-
and a
. At
South
is no
much
tive's
en to
cede;
to re-
com-
busi-
cred-

ually
tour-
ip to
still
er, if
do de
aulo,
and
may

any
ress
rom

d is
-set,
itch
the

ted
ation

N
0.
ss.

1939

Now if you want details . . .

here they are



Twin Disc MT Clutches are furnished either as a single, multiple disc clutch or as a double multiple disc clutch, called a duplex.

The duplex model consists of two single clutches combined in one unit, having a common engaging cone and operating lever.

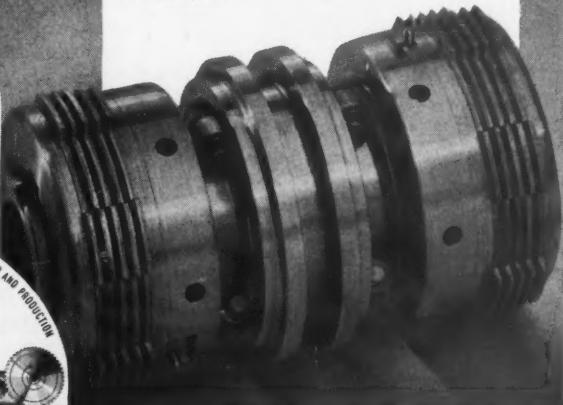
Both the single and the duplex clutches are available in either "dry" type or in "oil" type.

Dry type clutches are particularly suitable where a compact clutch of high torque capacity with comparatively low operating pressures is required: cut-off service for example. The dry type may also be used as operating clutches where frequency of use does not dictate a clutch of the oil type.

In the "dry" type Twin Disc MT Clutch, the friction surfaces of the driving plates are asbestos and the driven plates are of saw steel, heat-treated and ground.

In the "oil" type clutches, the driving plates are of hard, phosphor bronze, perforated with oil release holes and the driven plates are of saw steel with radial grooves for quick oil release. This assures positive, smooth engagement . . . a minimum of drag between the clutch plates when the clutch is operating in disengaged position.

There is a Model in Twin Disc MT Clutch line that has a place on your Machine Tool because it will add to the performance of your machine. It will do its job with a minimum of attention because it is "built-for-the-job" by clutch specialists. Why not ask our Engineering Department for recommendations?

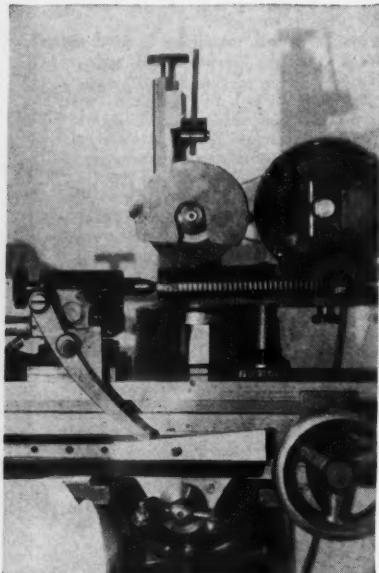


TWIN DISC CLUTCH COMPANY • 1326 RACINE STREET, RACINE, WISCONSIN

TAPS GROUND

with

ONE MACHINE SET-UP OPERATION



This Circular Relief Grinder handles ALL tools that require clearance along their periphery.

Grinding wheel is dressed concavely to exactly the curve of tool to be ground. Clearance is controlled (.0005" or .0500" with the same curve) by offsetting tool from the center of this curve. Tool is then ground to cutting edge. ONE machine...ONE set-up...ONE operation.

Write for complete information.

THE CLEVELAND TOOL ENGR. CO.
9205 DETROIT AVE., CLEVELAND, O.

learn a lot about his prospective customers south of the Rio Grande—especially if he has already studied the market research report that was especially prepared for him and if his stay in the cities mentioned has been planned in advance so as to afford him the very best advantage for studying both the native and the foreign businessman.

Any man, even though he be the most energetic executive, is no more than human and finds it difficult to absorb new impressions after he has been driven around on combination sightseeing trips and business tours for hours and days. The American visitors should be able, however, to obtain a sufficient amount of information regarding the personal and business background of his prospective representative so that he can judge the applicant according to South American standards.

Efficiency and reliability are the same everywhere, although the manifestation may be different. Extravagant sales talk is so common in the States that an applicant with a quiet and polite approach might be suspected of being lacking in force or energy—if measured by American standards. But business methods are different in the Argentine, and your agent should be given time to develop his ideas according to his knowledge of the situation.

Argentina is a good market. The country, and especially its capital, is progressing at tremendous speed. But if you decide to go into the Argentine market, go in with a definite plan for a long pull and then stay with it. Have faith in the Argentines. Don't let them down when wheat prices drop; they have meat and hides, maize, linseed, cotton, and wool to pay for imports.

Don't underestimate their ability and experience; competition of Euro-



BLACK DIAMOND FILES

PIONEERS IN QUALITY PRODUCTION

75th
ANNIVERSARY
YEAR

pean manufacturers has taught them everything they need to know. Try to "speak their language" in the sense in which that phrase is usually meant, and try to understand how they think. Business is not easy anywhere, and it is no more difficult in the Argentine than in most of your other sales districts. Argentines want medium quality and medium prices, with occasionally high quality at high prices, but never—at least in machine equipment—poor quality at any price. They expect the same credit facilities that are offered by your competitors, but financing arrangements are available under reasonable conditions through the local branches of American banks.

There has been much talk about Pan-American cooperation. This talk can be crystallized into action in just one way—by making sure what sales possibilities exist for your prod-

ucts in the Argentine market, then going after the orders. It has been done by others, and it can be done by you.

Practical Heat Treating

(Continued from page 54)

trol described in this article, he can be assured of work the quality of which will cease to be a serious problem. The guesswork which up until recently has been associated with this type of treatment has been eliminated.

The Atlas General Catalog for 1939, recently released, presents the most complete information ever available on Atlas lathes, shapers, drill presses, arbor presses, and shop equipment. Twenty-four of its 72 pages are devoted to the new 10-in. Atlas lathes with power cross feed. Copies are available from the Atlas Press Company, Dept. 7, 146 N. Pitcher St., Kalamazoo, Mich.—ask for Catalog No. 39.

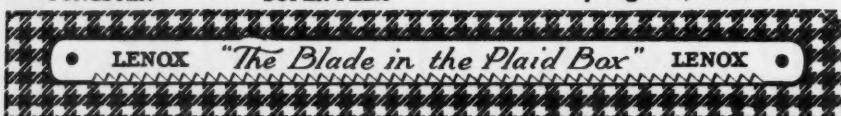
SET THESE PACKS OF LENOX WOLVES ON THE TRAIL OF METAL CUTTING JOBS!

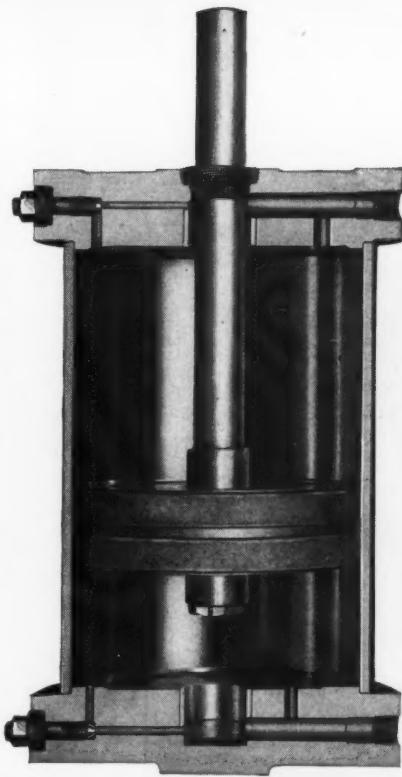


Cut for cut, blade for blade, "LENOX" quality and uniformity more than hold their own. If you are looking for long lasting keen edge blades insist on LENOX.

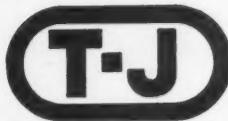
*Sold by distributors
everywhere*

**American Saw & Mfg. Co.
Springfield, Mass.**





TOWARD
YOUR BETTER PRODUCT



announces . . .

HARD CHROMIUM PLATED cylinder walls and piston rods

During intervals of non-use and before installation, cylinders are ordinarily susceptible to rust. From the various methods of preventing this condition, Hard Chromium plating was selected because, in addition to its ably solving the rust problem, it becomes an important factor in increasing the efficiency of the cylinder. The same moisture (from the condensation of compressed air) or water (when the cylinder is used for water-hydraulics) which would ordinarily cause corrosion, now acts as a lubricant on these hard chromium plated bodies and piston rods, actually increasing the "slickness" of the surface. This, in combination with the polished, smoother surface obtained, means less friction and prolonged packing life. Of no less importance is the fact that these cylinders with this new feature are now being furnished at no extra cost. More "service" features are described in our catalog No. 36-A. It will assist you in selecting the type of cylinder that will help you toward your better product.

this is a **TOMKINS-JOHNSON** product

Factory at 620 N. Mechanic Street, Jackson, Michigan. Agents in principal cities. T-J products also include Oil Hydraulic Cylinders . . . Remote Control Systems . . . Rotating Chucks and Cylinders . . . Rivitors . . . Clinchors . . . Special Equipment . . . Brownie Coolant Pumps . . . T-J Die Sinking Milling Cutters.

"ROCKWELL" HARDNESS TESTER



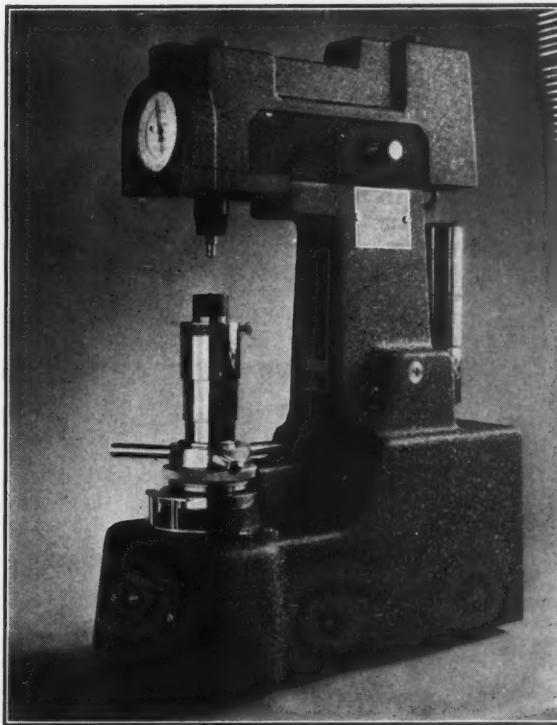
In Tool Room, Test Room and for miscellaneous testing on inspection.

WILSON
MECHANICAL INSTRUMENT CO., INC.

They all

CONCORD AVE. & 143RD ST.

"ROCKWELL"
Motorized
HARDNESS TESTER



For inspection testing of thousands of moderate size or small parts each day.

read alike

NEW YORK, N. Y.

October, 1939

WILSON
MECHANICAL INSTRUMENT CO., INC.

MODERN MACHINE SHOP

85

Modern Mercury Lights Aid Manufacture of Tube Cleaning Equipment

By PAUL T. KEEBLER
Factory Manager, The Elliott Company, Springfield, Ohio

A LITTLE known industry, yet one whose products are used in almost every branch of industry, consists of the manufacture of tube cleaners. Originating in 1898 with the invention of a boiler tube cleaner, the industry has grown until, today,

The Elliott Company maintains a nationwide organization, with district offices in all principal cities, making available trained engineers for the sales and servicing of tube cleaners of all kinds.

Tube cleaners are used for cleaning



The milling machine and drill press departments of The Elliott Company, Springfield, Ohio, receive a large amount of natural daylight. In machining operations, however, the company has found that more artificial light is required in the daytime than at night, because of the greater contrast encountered from the light of day.

SPECIFIED



for UNFAILING PERFORMANCE

Progressive manufacturers specify "Holo-Krome" FIBRO FORGED Socket Screws because they know the Screws are right when they get them. Steel — Heat Treatment — Threads — Sockets — Finish — every known means is employed in the checking, gauging and testing during each step in the patented method by which Holo-Krome Screws are made. In addition, every batch of Holo-Krome Screws are TEN-TOR Tested (exclusively Holo-Krome) to ascertain the required physical properties, in their correct proportions, before they get the "OK" tag of inspection approval. If you want Unfailing Performance — Specify Holo-Krome.



HOLO-  **KROME**

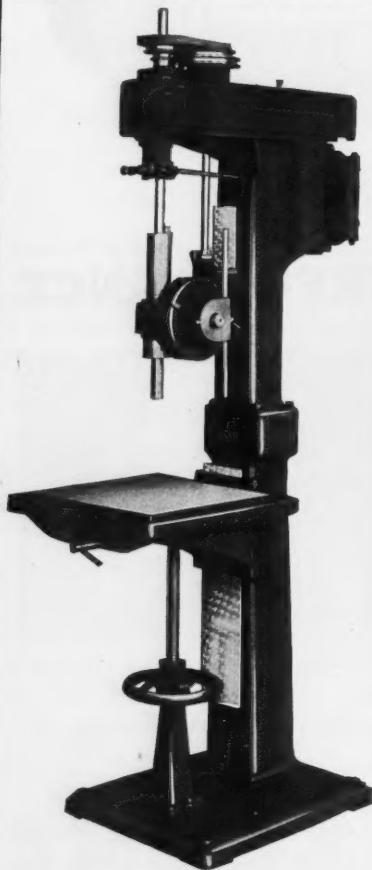
FIBRO-FORGED
Trade Mark
Socket Screws

THE HOLO-KROME SCREW CORP.
HARTFORD . CONN., U. S. A.

BRITISH REPRESENTATIVES:
GEO. H. ALEXANDER MACHINERY, LTD.
82-84 Coleshill St., Birmingham



REED SENSITIVE DRILLS



POWER AND HAND FEED: 1 to 6 SPLS.
Floor or Bench Types. Motor or Belt Drive.
High Speed Production Drills for Accurate Work • Simple, Rugged Machines
Meeting All Drilling and Tapping Requirements.

Production Machine Co.
GREENFIELD, MASS.
POLISHING MACHINES

boiler tubes throughout the world. During the last 20 years tube cleaners have also been adopted for use by oil refineries for cleaning carbon deposits which form in the tubes of oil stills and cracking furnaces. Other uses for tube cleaners include the cleaning of arch tubes in locomotives, evaporator tubes in the salt and sugar industries, and condenser and superheater tubes, as well as for cleaning



Operation of a tube cleaner is shown here. The cutting head is being placed in the end of the tube, and as the cutters revolve, scale is quickly removed. The bodies of these tube cleaners are machined from solid steel, and all wearing parts are of alloy steel, hardened and precision ground.

various sizes and types of pipes and tubes in many different production processes.

The modern tube cleaner is a high-speed, precision-built tool, power-driven by water, steam or compressed air. In the plant, every method possible is used to facilitate high production while maintaining the required precision. The milling machine and drill press departments are models of plant cleanliness and efficiency. Large windows on all sides of the plant permit the entrance of a large amount of daylight, and the



— GET RESULTS —

Use these new HACK SAWS
"The RED Blade"

Ask Your
Dealer for

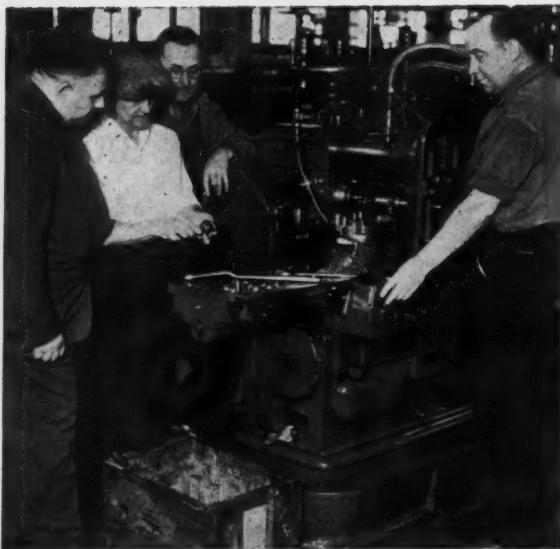
SIMONDS
MOLYBDENUM
HACK SAWS
"The RED Blade"

Fast, easy cutting blades. Great for long wearing and edge-holding on tough cutting -- for hand or power.

Buy them on your very next order.

Made by

SIMONDS SAW and STEEL CO.
FITCHBURG, MASS.



Paul Keebler, at the left, inspects a machine part at the plant of The Elliott Company. Close tolerances are obtained under detail-revealing mercury light. Reducing glare and shadows to a minimum, Cooper Hewitt mercury lamps have aided production by minimizing eye fatigue in critical seeing tasks.

ble amount of glare and shadows.

After a thorough study of the requirements of our plant, we determined that the use of long-tube light sources would provide the best solution to our problems. On the recommendation of engineers of the General Electric Vapor Lamp

Company, we installed Cooper Hewitt mercury vapor lamps on 10 x 11-ft. centers at a height of 8½ ft. above the floor. These lamps are 50 in. in length, and are rated at 350 watts.

The high light output of Cooper Hewitt lamps enables us to obtain an evenly diffused illumination at a level of 32 foot-candles. The detail-revealing nature of mercury light has proved a great aid to production in showing up the machining operations with a minimum of glare, as well as enabling the operators to detect small flaws without incurring eyestrain at the end of the day's work. A further advantage has been the ability of mercury light to blend with daylight, without the harsh contrast encountered when the yellow-red rays of incandescent lamps are used to supplement natural daylight.

In the drill press department, where parts for motors used in air-driven tube cleaners are often drilled as deep as 8 or 10 in., it is obvious

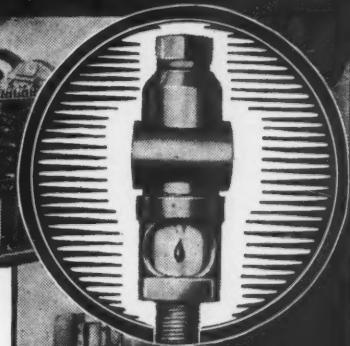
machines are arranged so that full advantage may be taken of this natural light.

However, in spite of the fact that the plant is operated only in the daytime, artificial lighting is used at all times to supplement the light from outside. Our experience in machining operations has shown that for greatest production efficiency, a higher illumination level is required in daytime than at night in order to minimize the extreme contrast encountered from the light of day.

When the lighting installation was made in the machining and boring departments, our objective was to provide a level of general illumination sufficiently high so that the need for drop lamps could be reduced to a minimum. Naturally, the problem of glare in machine shops is always a serious one, and for this reason a primary requirement of the system was that it provide detail-revealing illumination with the smallest possi-



LUBRICATED FOR LIFE

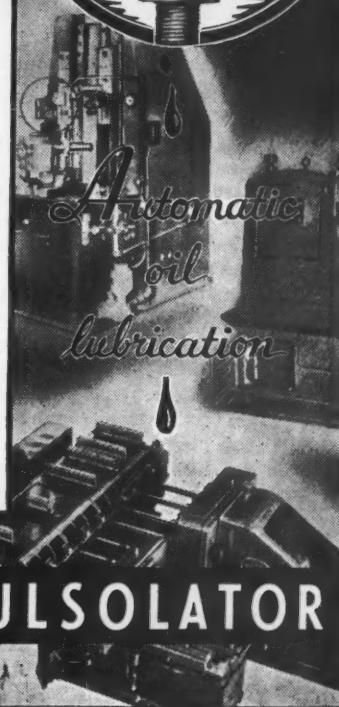


The machine tool market asks for more pieces per hour. The machine tool asks for higher speed and more automatic control. The machine designer asks for ideas.

Let us help. Our engineers are ready to show you how Pulsolator can automatically lubricate your machines for life.

write for bulletin b-30

Rivett
Lathe & Grinder Inc.
Brighton, Boston, Mass.



BLANCHARD PULSOLATOR



A uniform level of illumination of 32 footcandles is provided on the working plane by long-tube Cooper Hewitt lamps. The lamps are mounted at a height of $8\frac{1}{4}$ ft., spaced on 10 x 11-ft. centers. In order to obtain directional control of shadows, the lamp over the machine in the foreground has been mounted at right angles to the machine.

that no form of general overhead illumination can penetrate into the recesses sometimes encountered. As a result, we have found it necessary to resort to the use of drop lamps for these special operations.

Local lighting at these points is provided by inside-frosted blue-glass bulbs, rated at 50 watts. The lamps are specially made to operate on 220 volts, so that the lamps light up when the machines are turned on. Special focusing reflectors are used to concentrate the light when it is necessary to see into the small, deep recesses.

General overhead illumination in the machine area is provided by 40 Cooper Hewitt lamps. In the buffing and grinding department, 2 lamps of the same kind are used. The tool room utilizes 6 lamps and 8 more light the assembly benches. Since our

installation of mercury light has been made, increased production has resulted through a reduction in the number of rejects. The most worthwhile end achieved, however, has been improved employee welfare, a result of lessened eye fatigue through improved plant lighting.

\$9,316,000 in New Plants for the South

Of definite encouragement is the announcement in the columns of the "Construction" daily bulletin during the past month of over \$9,316,000 in contracts awarded for new industrial plants and expansions in the 16 Southern states. Several involve more than a million dollars each and twelve will cost more than \$100,000 each. All privately financed, they indicate in a tangible way returning confidence of capital and further development of the South's resources.

(*Manufacturer's Record*)



STATEMENT OF POLICY

The world is entering a crisis, the result of which no one can foresee. Other wars have brought inflation, followed by unemployment and depression after peace was achieved. America's experience in the Word War illustrates this fact.

Much of this post-war trouble would have been eliminated by a more foresighted price policy on the part of manufacturers and distributors. Price inflation by the seller when he had a dominant position resulted inevitably in reaction with deflation, depression and suffering. Many of those price increases were not warranted.

Before such an inflationary cycle of prices is again started, we publicly pledge ourselves, as far as possible, to maintain present prices.

Further, if the materials we buy are increased in price, or the cost of labor is increased, then we pledge ourselves to raise selling prices no more than the bare increase in cost of raw materials and labor going into our products.

Further, we pledge ourselves to pass on to our customers the reduction in cost made possible by better manufacturing methods, wider distribution and technical advances in production.

THE LINCOLN ELECTRIC COMPANY

Cleveland, Ohio
October 2, 1939

A cursive signature in black ink that reads "J. F. Lancerlo".
President



21st Annual National Metal Congress and Exposition

CHICAGO will be the 1939 host to the four societies who will cooperate in presenting the 21st Annual National Metal Congress and Exposition which is to be held in that city October 23 to 28 inclusive. The four societies are the American Society for Metals, The Wire Association, American Institute of Mining and Metallurgical Engineers, and American Welding Society.

Advance hotel and society reservations point to one of the heaviest enrollments in the history of the Metal Congress, and optimism is high among the more than two hundred exhibitors and thousands of members of the four component societies. According to W. H. Eisenman, secretary of the American Society for Metals (the sponsoring society) and managing director of the Exposition, the war in Europe has stimulated the demand for exhibition space. The men who attend the Congress and Exposition will be more than ordinarily interested this year because they will have a keen and highly spe-

cialized interest in the problems that may arise in the next few months. Those who are able to anticipate some of their problems will be looking for answers at the National Metal Congress and Exposition.

Business has taken a definite upturn and, according to Mr. Eisenman, it is an interesting fact that attendance at the Metal Shows has always been heaviest during the years when industrial production was at its peak. It is also interesting to note that advance room reservations in all of the hotels in Chicago are ahead of previous years. The rush of requests for space at the Metal Exposition indicates that manufacturers feel that this is the logical time to demonstrate their newest developments to the industrial executives who visit the Metal Congress and Exposition.

The Metal Exposition will be held at the International Amphitheatre. Technical sessions of the various societies will be held as follows:

American Society for Metals; The

Palmer House

The Wire Association; Congress Hotel

American Institute of Mining and Metallurgical Engineers; Blackstone Hotel

American Welding Society; Hotel Stevens.



(Above) President, Wm. P. Woodside, *Climax Molybdenum Company*.



(Left) Vice President, J. P. Gill, *Vanadium-Alloys Steel Company*.

(Right) Treasurer, Bradley Stoughton, *Lehigh University*.

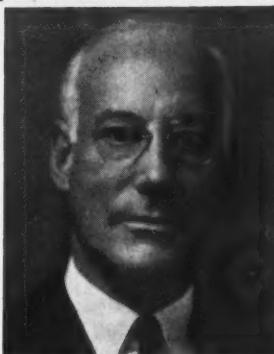
Inasmuch as Chicago is the location of some of America's greatest industries, visitors to the Metal Congress and Exposition will be able to enjoy the exceptional opportunity which will be afforded to them to visit some of these great plants. Among the plants included on the list at time of going to press are the Western Electric Company, Electro-Motive Corporation, Carnegie-Illinois Steel Corporation, Inland Steel Company, International Harvester

Company's Tractor Works, Chicago Latrobe Twist Drill Works, Stewart-Warner Corporation, American Can Company, and Lindberg Steel Treating Company. In addition to these, special plant visits will be arranged for the different associations to enable their members to study processes

with which their industries are directly connected or in which they are especially interested.

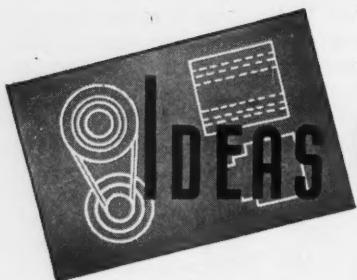
Altogether, the tech-

(Below) Secretary, Wm. H. Eisenman.



Officers—American Society for Metals

nical sessions in which papers on newest developments will be presented by outstanding figures in the various societies, the interesting plant visits, and the Exposition will provide an opportunity for the engineer or plant executive to bring his knowledge or his industry up to date and thus keep himself abreast of the times.

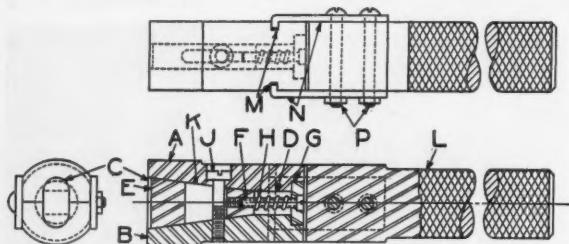


IDEAS FROM READERS

Adjustable Plug Gage for Reducing Plug Gage Investments

By JOHN A. HONEGGER

THE average small-size manufacturing plant is not always in position to maintain a complete range of



Drawing of Adjustable Plug Gage

plug gages for the work which it handles. To aid in getting out the work in one such plant, the writer designed the adjustable plug gage shown in the illustration.

The gaging end proper consists of two halves, **A** and **B**, the plug being split on the center line. Each half has a rounded angular slot, **C**, milled to run into the parallel slot **D**. The slot **C** contains a tapered wedge shoe, **E**, which is moved axially in the slot by means of the screw **F**. This screw is fitted into a washer, **G**, which is counterbored into each half of the

parts **A** and **B**. The purpose of this washer is to allow for the expansion of the halves **A** and **B** and still maintain the adjusting screw **F** in a central position.

Through the halves **A** and **B** a hole is drilled, counterbored, and tapped for the clamp screw **J**. This screw moves back and forth in the slot **K** in the wedge **E**, thus enabling the wedge to be locked in any position in the slot **C**.

To use, the screw **F** is threaded into the wedge **E**, drawing the wedge along the tapered slot **C** and thereby spreading the halves **A** and **B** apart. When the halves have been spread to the proper

size, the screw **J** is tightened, locking the wedge **E** in position. The plug gage is then ready for use. If a smaller plug size is desired, the clamp screw **J** is loosened and the adjusting screw **F** is unscrewed from the wedge **E**. The action induced causes the spring **H** to force the wedge out toward the end of the plug gage, enabling the parts **A** and **B** to contract.

When gaging deep holes, an adapter handle as shown at **L** is employed. Two slots, **M**, are milled in the sides of the plug gage and fitted with the



HANNIFIN High Efficiency CYLINDERS

Sectional View

Equipped with Hannifin outside adjustment of piston packing for easy maintenance of high efficiency piston seal. Cylinders are bored and then honed, giving straight, round, perfectly smooth cylinder bore. Single or double acting types, sizes 1½ to 16 in. diam. (or larger), for any length stroke, with or without air cushion. Write for Bulletin 34-MM.

Hydraulic Cylinders

Sectional View

Patented no-tie-rod design, with universal end caps which can be independently positioned. Special mirror finish honing produces a straight, round, perfectly smooth cylinder bore, for perfect piston seal. Six standard mountings, with small piston rod, 2 to 1 differential piston rod, or double end piston rod. Built with or without cushion. Write for new Bulletin 35-MM.

HANNIFIN MANUFACTURING COMPANY

621-631 South Kolmar Avenue • Chicago, Illinois

ENGINEERS • DESIGNERS • MANUFACTURERS • Pneumatic and Hydraulic Production Tool Equipment

sheet steel grips N. The width of the handle is slightly less than that of the gage so that when the screws P are tightened the tongues of the grips N bind in the slots M and thereby hold the handle adapter onto the end of the plug gage.

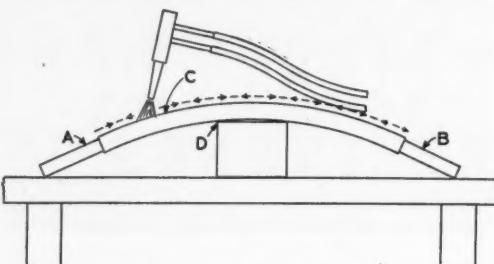
To complete the task for which the gage was designed, twelve gages were made together with three handle adapters, to accommodate holes from $\frac{1}{2}$ -in. to 3-in. diameter. The increment of adjustment was slightly more than $\frac{1}{4}$ inch.

Bending Tubing Without Causing Wrinkles

By PETER L. BUDWITZ

THE writer is acquainted with a job wherein some brass tubing one

inch in diameter and approximately two feet in length was to be bent to a curve having a large radius, the requirement being that the tubing be



Drawing showing method of bending brass tubing without causing wrinkles.

absolutely free of the slightest wrinkle after being formed. The method by which this task was successfully accomplished is shown in the drawing herewith.

Two short pieces of steel, A and B, were inserted a short distance into the ends of the straight tubing C, and the tubing was placed on a block as shown at D. A torch flame was then applied to the tube, starting at the center and moving from end to end. The tubing softened as it became heated and the two short pieces of steel bar, A and B, acted as weights which gradually forced both ends of the tubing downward. When the desired curvature was obtained, the steel weights were removed and the tubing was allowed to cool.

RIVETERS

GRANT

Pioneers in the riveting field. Head rivets from smallest to $\frac{1}{4}$ " diameter, either by noiseless spinning or vibrating hammer method.—Sizes to meet all needs.—Types include Vertical and Horizontal Multiple Spindles.

Write for literature—and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.
96 SILLIMAN AVE. BRIDGEPORT, CONN.

Inserted-Tooth Face Mill

By L. KASPER

THE drawing shows the construction of a face milling cutter that is designed for utilizing high speed tool bits as cutters. As the cutter was to be used for facing surfaces

ARMSTRONG-BLUM Mfg. Co.

"The Hack Saw People"

5745 Bloomingdale Ave. Chicago, U. S. A.

Eastern Warehouse and Sales:
199 LAFAYETTE ST., NEW YORK

- 
1. Integrally Welded.
 2. Tough Alloy Steel Back.
 3. Genuine 18% Tungsten High Speed Steel "Teeth."

WRITE
FOR
CIRCULAR



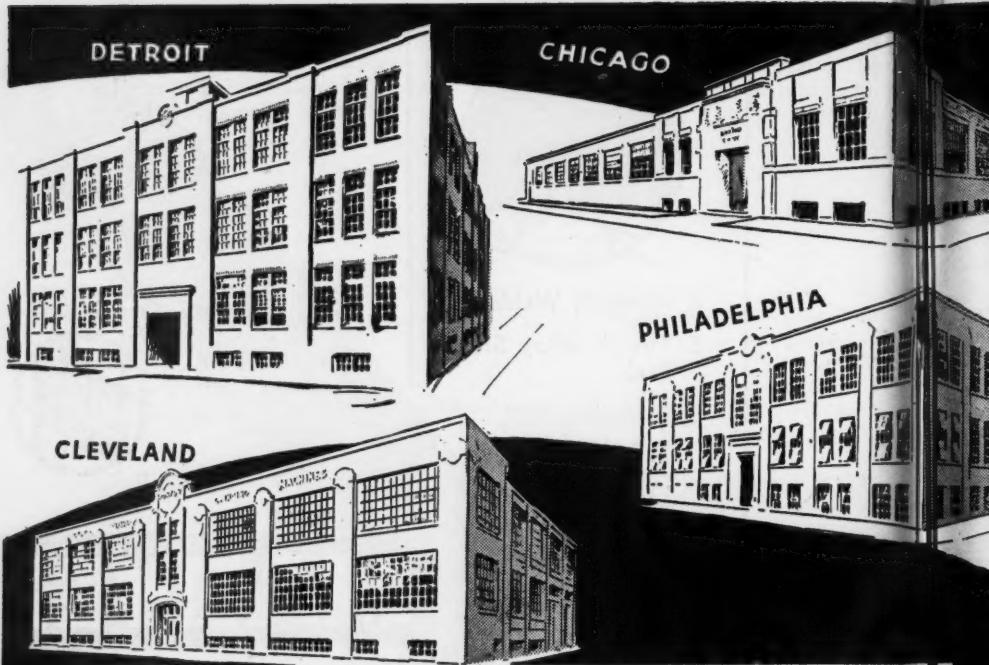
MARVEL

A Tauter Blade Means A Straighter Cut!

On any hack sawing machine, a tauter blade means a straighter cut . . . a High-Speed-Steel cutting edge means faster cutting . . . and an unbreakable blade guarantees uninterrupted production and a full cutting life.

MARVEL High-Speed-Edge Hack Saw Blades offer all of these factors — permit cutting speeds, feed pressures, and blade tensions, limited only by the sawing machines' capabilities. These are the blades that built sales. Cut faster, cut straighter, and last longer—that are both strictly high speed and positively unbreakable.

Buy from your Local distributor



Over Half a Million Wheels in Five Branch Warehouses

EACH of these branch warehouses is a vital nerve center in the Norton distribution system—a connecting link between customer, distributor and the Worcester plant. With their large stocks of grinding wheels and other abrasive products, their highly trained personnel, their special equipment for altering wheel sizes and shapes they bring real meaning to the words "Norton Service."

And supplementing these five strategically located Norton warehouses there are Norton distributors in 151 key cities of the United States alone with thousands of wheels on their shelves.

NORTON COMPANY

W-13

MANUFACTURED AND SOLD
WORCESTER, MASS.

NORTON SERVICE



DISTRIBUTION...

*the story of Norton
plants and warehouses*

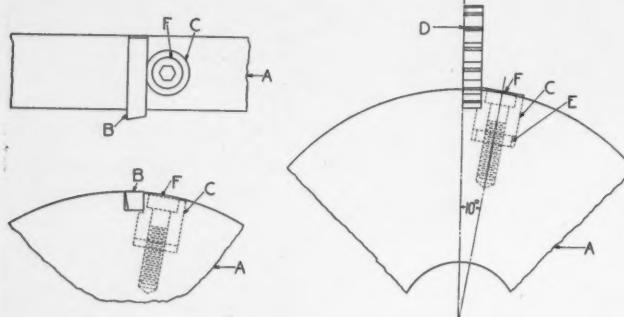


NORTON ABRASIVES

MANUFACTURED AND SHIPPED AT
WORCESTER, MASS., U.S.A.

as closely as possible into corners, one of the requirements of the design was the elimination of screws or other fastening equipment that would project beyond the periphery of the body of the cutter.

Referring to the drawing, the cut-



(Left) Drawing of inserted-tooth face mill. (Right) Drawing showing method of milling tool bit groove in body to produce required flat on bushing.

ter consists essentially of the body A, the toolbit B, the bushing C, and the screw F. The toolbit is inserted into a groove milled on the periphery of the body A, the leading edge of the tool being set radial with the center of the body. The bushing C fits into a counterbored hole in the body A as shown and is drawn to the center on a radial line by the screw F. One side of the bushing is flat milled so as to contact the trailing

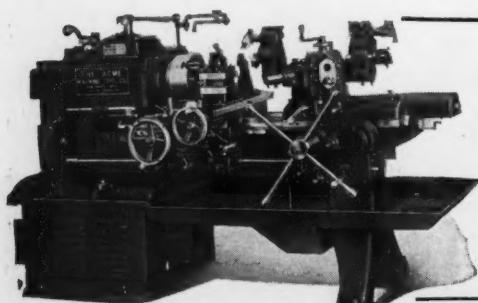
side of the toolbit B.

Because of the fact that both the toolbit B and bushing C are set radial, any movement of the bushing C toward the center of the body narrows the width of the groove in which the toolbit B is inserted. In this manner, the bushing C clamps the toolbit tightly in its groove.

The sketch at the right in the illustration shows the manner in which the toolbit groove is milled in the cutter-body and the required flat produced on the bushing C. The bushing is first screwed down tightly on a slug

or washer placed in the counterbored hole as shown at E. This slug or washer is of a thickness to cause the bushing to project a short distance beyond the periphery of the body A.

A groove is then milled into the body by the cutter D as shown, producing the required flat on the bushing C. The slug E is then removed and the toolbit B inserted in the groove. The angle between the radial



Cincinnati Acme Universal Turret Lathes

The No. 4W Acme Universal Turret Lathe with its unusual high operating efficiency and simplified design, insures maximum production on all work within range. Write for circular.

**THE ACME MACHINE TOOL
COMPANY**

CINCINNATI • OHIO



Buckeye
MACHINED AND CENTERED
13" Bars

● Buckeye cored and solid 13" bars, with machined outside diameters and machined and centered ends, are ideal for maintenance work. Buyers save approximately 25% of purchased weight as compared to rough bars, and avoid making the hard outside cut. Set-up in a universal chuck can be accomplished quickly. The bars are easily machined to finished size and can be cut into standard bearing lengths with a minimum of waste. Typical Buckeye quality throughout—free of blow holes. Prompt shipment of the most popular sizes from stock. Write for prices and full details.

No order is too big or too small for Buckeye

OTHER BUCKEYE PRODUCTS INCLUDE . . .
13" rough bars in a wide range of sizes,
851 sizes of ready-to-use finished bushings, 160 sizes of ready-to-use electric motor bushings—carried in all warehouse stocks . . . also special bearings in an infinite variety of shapes, sizes, and bearing metal analyses to meet any specification.

Let us quote on your requirements

Buckeye
BRASS AND MANUFACTURING COMPANY

BRONZESMITHS



SINCE 1900

6412 HAWTHORNE AVE.

CLEVELAND, OHIO

line of the toolbit and the bushing is approximately 10 deg., which is sufficient to provide a powerful gripping force even with heavy cuts.

Adapting Old Foundations To New Equipment

By ELTON STERRETT

ACCORDING to preliminary figures, the installation of a battery of new and larger engines in an oil pumping station promised to be just another routine erection job. However, when the new units, four-cylinder engines replacing three-cylinder units of the same make, arrived and were trucked to the station site, it was found that the new bases required 1½ in. more space between the transverse foundation bolts than had been provided with the earlier equipment.

Since plans called for utilization of the old foundations with a new "tail" cast on at the end opposite the flywheel pit to provide for increased

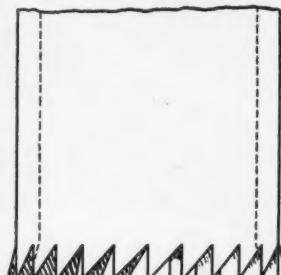
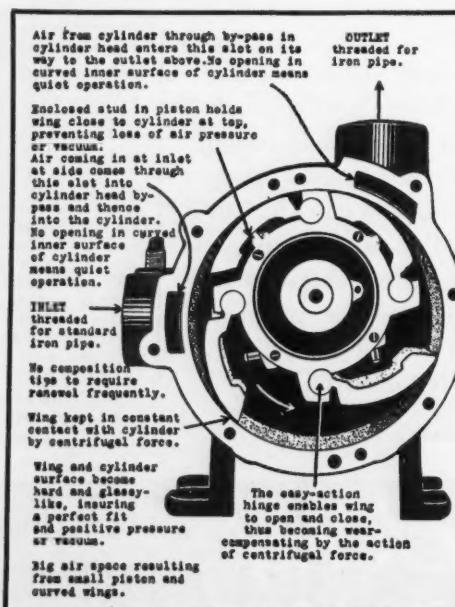


Fig. 1 — Teeth cut in end of 2-in. pipe and faced with tungsten-carbide tips permit drilling around old foundation bolts without subjecting concrete to shattering impact of hammer and drill method.

overall length, the only alternative seemed to be to drill new holes and set new bolts. This plan was com-



LEIMAN BROS. PATENTED HIGH PRESSURE BLOWERS AND VACUUM PUMPS GAS BOOSTERS AIR MOTORS

Gas Furnaces -- Blow Pipes -- Oil Burners -- Gas Machines -- Atomizing -- Agitating -- Vacuum Printing Frames -- Paper Feeding -- Bottle Filling -- All Automatic Devices.

SENT ON TRIAL!
They Take Up Their Own Wear
LEIMAN BROS. 3W-23 WALKER ST.
Makers of Good Machinery For Fifty Years



Universal Joints for General Commercial Applications

- The NATCO Patented Universal Joint is made of alloy steel, heat treated, hardened and ground. It is fulfilling the requirements of many manufacturers who demand a compact joint, built with precision, insuring perfect balance, durability and maximum strength.
- NATCO joints are constructed of a multiple of but three distinct parts, namely: one center block, four identical drive sides

and two identical short ends. The center block contains a lubricating feature which keeps the trunnion lubricated and is machined from a solid block of steel, thus eliminating the chance of trunnion pins working loose.

• NATCO joints are built in eight different sizes, ranging from $\frac{5}{8}$ " up to and including 3" in diameter. Write for complete information.

**The National Automatic Tool Co.
Richmond, Indiana, U. S. A.**

Chicago Office, 2009 Engineering Building
Detroit Office, 409 New Center Building

NATCO
Universal Joints

Reduce
Flexible Drive Costs!
Investigate NATCO
Universal Joints
Today

**YOUR PRODUCTS
ALWAYS
IDENTIFIED
IF PERMANENTLY
MARKED**

IN THIS MACHINE



MARKING
BY ROLLING
IS FAST AND
ECONOMICAL
PRESERVES
DIE LIFE AND
PIECE PARTS.
REQUIRES
ONLY FRACTION
OF APPLIED
PRESSURE
AS COM-
PARED TO
STAMPING.

—
QUICK
SET-UPS

**MODEL 25
HI-DUTY
MARKING
MACHINE**

This machine operates from your plant air line, and is one of numerous models built to produce fast, neat marking on metal parts. Hi-Duty marking machines may be had for practically any marking operation, and we will be glad to make recommendations upon receipt of your inquiries. Send prints or samples of parts to be marked, showing lettering and location, also state required production.

GEO. T. SCHMIDT, Inc.
1808 BELLE PLAINE AVE.
CHICAGO, ILL.

plicated by the position of the old bolts, the centers of the bolts being moved only $\frac{1}{4}$ in. outward from the old longitudinal center line. With only a scant 4 in. of concrete between bolt and edge of raised engine base, drilling with a hammer and star drill was out of the question.

The problem of drilling, old bolt removal, and setting of new bolts was solved by devising a rotary drill which employed as a bit or cutter a

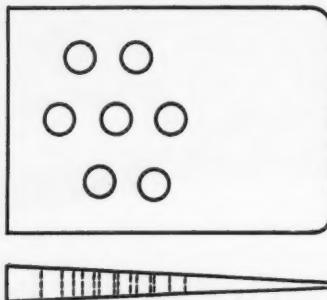


Fig. 2—Staggered drilled holes in steel wedge provide grip for pinch bar when removing from grout.

short length of 2-in. double-weight pipe upset on the end and cut with a series of teeth which were faced with tungsten-carbide for hardness. The drill is shown in Fig. 1. This drill bit was fed into the concrete by means of a motor-driven blacksmith's drill carried on a pipe frame that was arranged to straddle the foundation and permit accurate centering.

When fed into the work with the drill press feed screw, the drill cut a solid core out of the base. The only precaution necessary prior to drilling was cutting the rough rubble of the base with a chisel to give full bearing of the cutters at the outset. During drilling, a stream of water was directed into the drill pipe, washing away the cuttings through the space or clearance afforded by

the swaged teeth of the drill pipe, cooling the cutting edges, and serving to lay the dust.

After each hole had been drilled to the desired depth, the drill was withdrawn and the core snapped off by applying pressure at one side. The new bolt holes were drilled to a depth just below the head of the old bolts, and when flushed clean, were used for grouting-in the new bolts.

Another time and trouble-saving kink was employed while performing the job just described. In place of the customary blocking of shims, nuts, and other scrap metal used to level the bases prior to grouting, small squares of inch steel were bedded on the old base and wedges were used between them and the engine bases. These wedges, illustrated in Fig. 2, were drilled between faces with a series of staggered holes so that when grouted, the wedges could

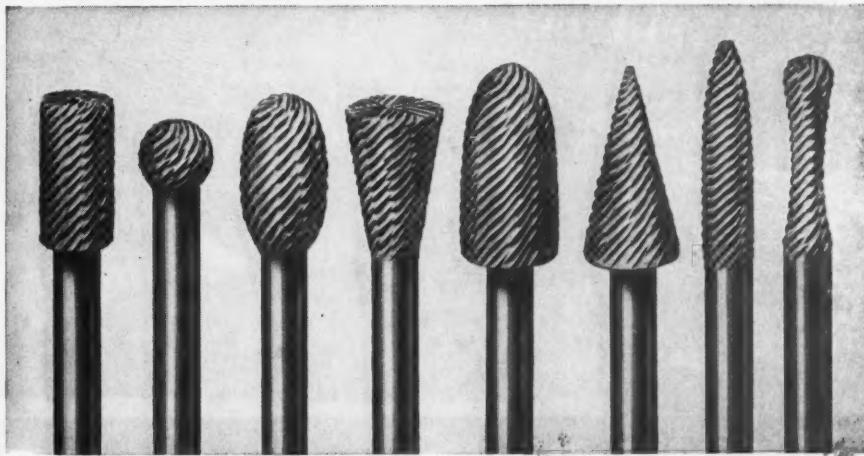
be withdrawn with a pinch bar set into whatever hole happened to be at the edge of the base. Adherence of grout to the wedge under the engine base was prevented by dipping the wedge in melted paraffin before using.

Grinding Fixture for Screw Driver Blades

By J. R. WHITTES

THE illustration shows a quick acting fixture that is designed for holding screw driver blades when grinding the flat surfaces of the blades on a surface grinding machine. The fixture consists of several small units, B, arranged in line by means of tongues, M, which are fitted into a T-slot in the base A of the fixture. Each unit is designed to hold four screw driver blades and is clamped

GROBET HAND CUT ROTARY FILES



SET KHC \$11.40

Ask for our catalog KR illustrating hundreds of rotary files hand cut, milled cut, ground from the solid; also burs. The most complete catalog of its kind.
Ask also for our catalog KF, showing 5,000 shapes and sizes of Grobet Swiss Files.

Photograph shows actual sizes

GROBET FILE CORP. OF AMERICA

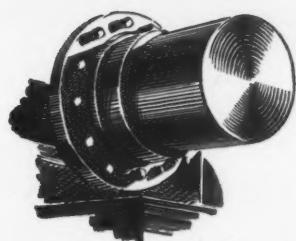
• 3 PARK PLACE
NEW YORK CITY

WASTE
shows up quickly
HERE...



TIDE WATER

THERE IS A COMPLETE LINE OF TYCOL LUBRICANTS SC



BUT IN BEARINGS

half the grease oozed away until Tycol
Green Cast Greases revealed the losses

"We felt that the lubrication job was not being well done. Pressures and temperatures seemed too high for the grease we were using. The amount used, too, was apparently excessive. Since we have been using Tide Water Greases there are differences that are readily noted. We were formerly compelled to pack the bearings twice a day; now we get along with one filling a day."

This plant also enjoys a feeling of confidence that the lubrication job is well done. Maintenance and replacement have been lowered. The reasons are easily understood: Ordinary greases formerly used were high in soap — soap necessary to give "body" to light bodied oils. Tycol Green Cast Greases are compounded of paraffine-base cylinder oils . . . oils that make possible a full-bodied grease with a minimum of soap. The more oil per pound of grease the greater the lubricating value of the grease.

There is a Tycol Grease and Oil scientifically engineered to fit each industrial requirement. Drop us a line. We will be glad to send one of our engineering staff to show you how "engineered lubrication" can save you money and worry.

Regional Offices: Boston, Philadelphia, Pittsburgh, Charlotte, N. C.

TIDE WATER ASSOCIATED OIL COMPANY

TIDE WATER DIVISION, 17 BATTERY PLACE

New York, N. Y.

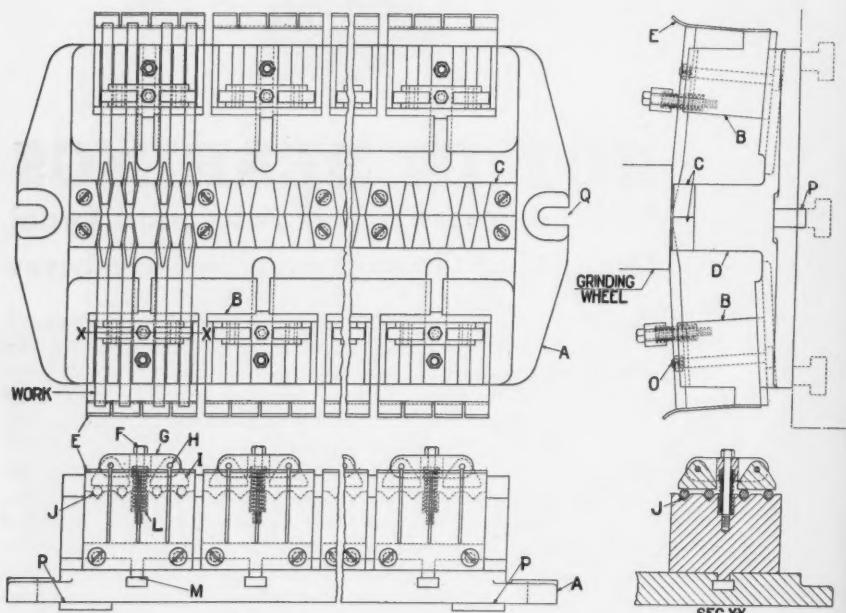
VISIT OUR BOOTH B-129 — NATIONAL METAL EXPOSITION

ER GREEN CAST GREASES

NT: SCIENTIFICALLY ENGINEERED FOR EVERY INDUSTRIAL USE

in position, after it has been set for the length of the screw driver blades, by the T-bolts O. The front end or flat portion of the blades rests in a taper slot in the plate C while the

mechanism by threading the screw F into a tapped hole provided in each unit B as shown. As this screw is loosened, a spring, L, contained in a counterbored hole in the manner



Drawing Showing Design of Fixture for Holding Screw Driver Blades When Grinding Flat Surfaces

other end rests in a vee, J, machined in the top surface of each unit B. The plate C is fastened by means of screws to a projection, D, in the center of the grinding fixture.

In order to press the blades into the tapered slots of the plate C and wedge them prior to clamping, a flat spring, E, is provided on the side of each unit B as shown. Clamping of the blades is accomplished by means of the levers G and equalizing clamps I. The levers G are slotted to receive the equalizers I, which are pivoted to the levers by the pins H. Pressure is applied to this clamping

shown raises the lever G, thereby releasing the pressure of the equalizing clamps on the blades so that the entire clamping arrangement can be swiveled to an angle of 90 deg. to enable quick loading or unloading of the workpieces.

The fixture is fastened to the grinding machine table by means of T-headed bolts placed through the slots Q, and alignment made by means of the key P.

Please mention that you saw it in MODERN MACHINE SHOP when writing to advertisers. Your cooperation is appreciated.

F
ach
is
a
ner

hannan

hannan

hannan

hannan

re-
ing
en-
be
to
of

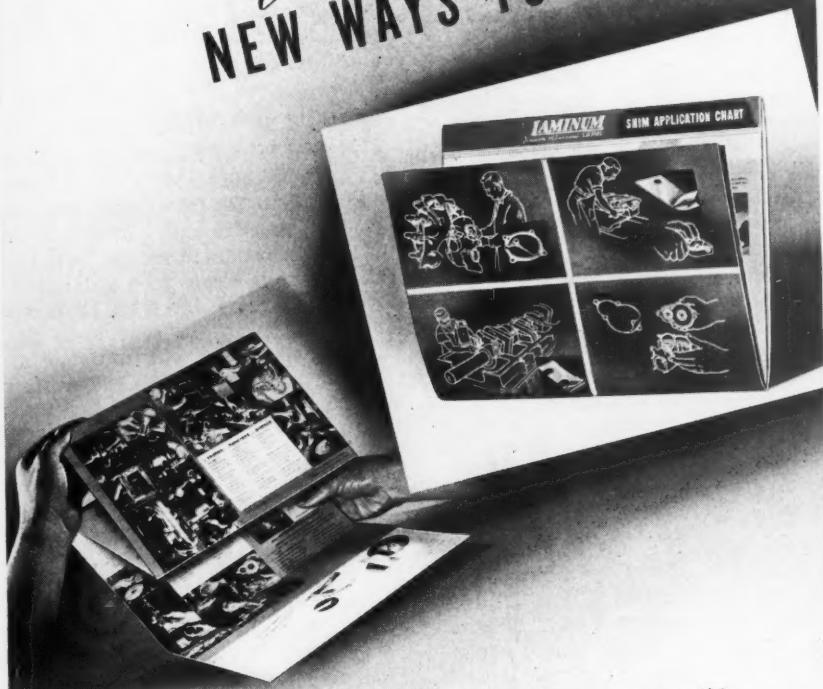
nd-
T-
ots
of

in
rit-
is

939



USE IT
to find
NEW WAYS TO SAVE . . .



In factory assembly
and service adjustments

• This new chart classifies approved uses of LAMINUM shims and shim stock throughout a score of industries . . . from aviation to diesels. With nearly fifty photographs of applications, it demonstrates the latest methods in factory assembly and service adjustments. The chart will show you what savings and precision are now made possible by LAMINUM . . . the "solid" brass shim that simply P-E-L-S for accurate adjustment—right at the job. Your choice of .002 or .003 inch laminations. (A Laminum sample will be mailed you together with the chart.)

LAMINATED SHIM CO., INC., 21-88 44th Ave., L. I. City, New York, N. Y.
CLEVELAND DALLAS HOUSTON LOS ANGELES MILWAUKEE TULSA 1327

THE SOLID SHIM THAT **LAMINUM**
TRADE MARK
peels FOR ADJUSTMENT

Over the Editor's Desk

The Americas for Americans

IN his article "What About Business in Argentina?" on page 72 of this issue, Dr. Schuck of Buenos Aires has presented some good, practical information regarding the possibilities for American business in the Argentine. Leaving off the literary frills, he has told us, bluntly but clearly, what can be done to develop Argentine markets and how to go about doing it.

As we go to press we learn that an announcement has been issued by the Argentine Exchange Control Office to the effect that restrictions on imports from the United States have been relaxed, making it possible to import merchandise in 62 classes which previously had been on the suspended list for the balance of this year. The 62 classes include such products as lubricants, iron and steel pipe, steel wire and steel cable, copper wire and copper cable, nails, nuts, screws, high carbon steel, ball bearings, and other items. The complete list can be obtained from the Department of Commerce at Washington. The items listed can be imported into Argentina in unlimited quantities.

The war in Europe will quickly set up a demand for metal products of all kinds aside from those barred from export by the neutrality law—in fact, many American plants are already working to capacity on orders from across the oceans, but while we are taking advantage of the opportunity to garner some European shekels let us not forget the opportunity now open to us south of the Equator. The time to cement our relations with the other countries in our hemisphere is now—not after the European war is over and the Euro-

pean countries begin flooding Brazil and Argentina with salesmen and sales literature.

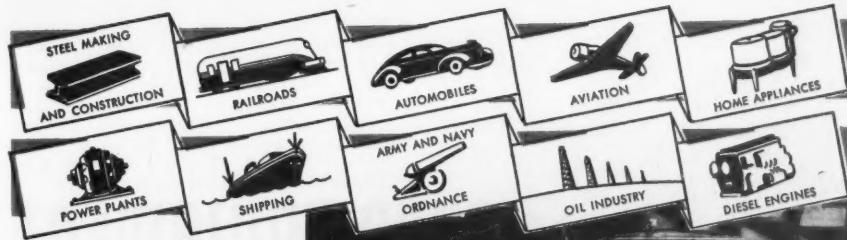
Planning for Safety

ATLANTIC CITY, N. J., will be "safety-conscious" on October 16th when 10,000 safety engineers and leaders converge upon that city for the 28th National Safety Congress. For five days these men will discuss hazards in the factory, in the home, on the highway, in school—in fact, in every phase of our national life.

All in all, there will be 140 sessions, at which 500 speakers and discussion leaders will present for the benefit of their audiences and groups the results of years of experience, research, and experimentation to the end that the hazards of modern living may be eliminated as far as possible. During these meetings an opportunity will be presented for novices in safety engineering or others who have safety problems to obtain the answers from experienced safety leaders.

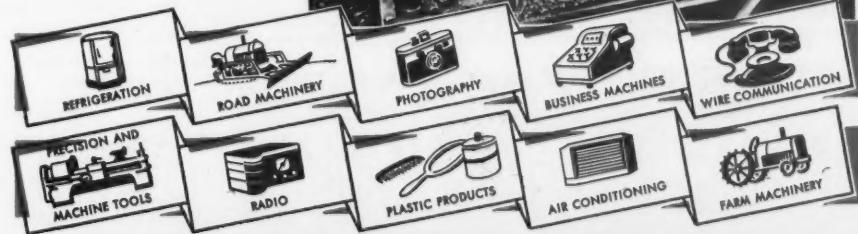
Men whose task it has been to safeguard the workers in great industries where safety has been an important factor for decades will be present to give the benefit of their experiences to plant executives and safety men from more isolated plants where the importance of safety programs has more recently become recognized. The interest will be enlivened by talks by national figures—Governor Saltenstall of Massachusetts, Secretary of Labor Perkins, D. D. Fennell, president of the National Safety Council, and others.

Safety is good business, and every industrial organization should have a representative present.



ECONOMICAL PRODUCTIVE RELIABLE UNIFORM

- These are the verdicts of an increasing number of Industries using NATIONAL Metal Cutting Tools.
- Many knotty metal cutting problems have been solved for them by NATIONAL Service Engineers.
- There is a Factory Branch or a Distributor near you.

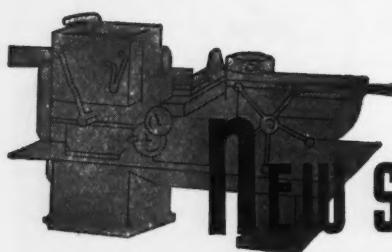


NATIONAL
TWIST DRILL AND TOOL COMPANY

Home Office and Factory—DETROIT, U.S.A.—Tap and Die Division—WINTER BROS., Wrentham, Mass.



TWIST DRILLS
REAMERS, HOES
MILLING CUTTERS
COUNTERBORES
SPECIAL TOOLS



NEW SHOP EQUIPMENT

Sellers Power-Flow Planer

William Sellers & Co., Incorporated, 1616 Hamilton St., Philadelphia, Pa., announces the "Power-Flow" Planer shown in the illustration. The planer offers many new and interesting features which are designed to save money through greater adaptability, a high degree of accuracy, fewer cuts, quick change-overs, ease of control, and so on. The planer is equipped with a new Sellers drive—a combination of Sellers special gear with anti-friction bearings throughout the drive.

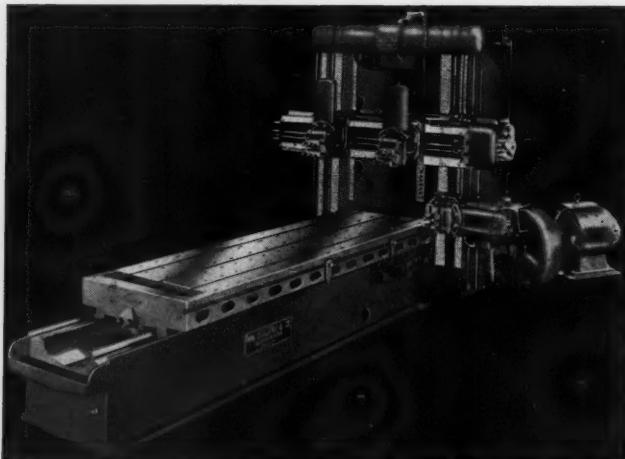
Besides the Sellers Spiral Gear Drive, features include compound table ways which eliminate the climbing of the table caused by unequal expansion of table and bed; a tool apron which is designed with horizontal T-slots its full width to provide greater variety of tool positions; a tool-holder abutment with

an adjustable feature; a tool slide so designed that two-thirds of its travel is below the crossrail with full length bearing surface at every point of its travel; centralized micromatic controls and extended back crossrail that has a full section extending from upright to upright; specially designed anti-friction bearings throughout, and pressure feed lubrication with independent powered pump.

All controls are centralized so that the operator can watch the entire machine without moving from his normal working position at the end of the crossrail. Automatic operation in either direction, inching for setting work, starting feed, and so on, can all be controlled from a pendant push button station. Power feed and traverse controls for the railheads are on the feed box at the end of the crossrail.

Rail elevation is accomplished by pulling downward a lever which is positioned on the right hand side of the machine, and turning it one way or the other to give direction. It is, thus, a one-handed operation and can be accomplished in a position which allows the operator to watch his work.

The standard railheads of the



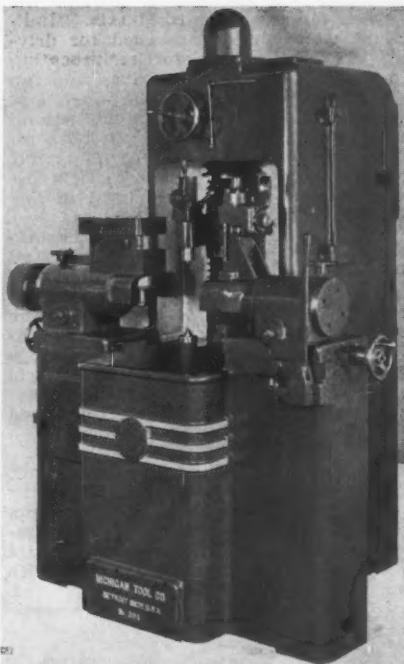
Sellers Power-Flow Planer

Power-Flow Planer have 64 feeds ranging from $1/64$ to 1 in. and the slides have 64 feeds ranging from $1/128$ to $\frac{1}{2}$ in. The side heads have 64 vertical feeds ranging from $1/64$ to 1 in., with 4:1 constant voltage motor cutting speeds ranging from 24 to 75 ft. per min. and return speeds from 50 to 100 ft. per min. These speed ranges are standard and can be increased or reduced to suit specific requirements. A variable voltage motor cutting and return speed with 30:1 range with low speed as low as desired or high speed as high as desired can be furnished.

Michigan Two-Lap Gear Lappers

A line of gear lappers of the two-lap type, employing the crossed-axis method of operation, is announced by Michigan Tool Company, 7171 E. McNichols Rd., Detroit, Mich. Automatic in operation, the machines are available in both vertical and horizontal models.

The machines are provided with electrical controls which permit adjustment of the lapping cycle to meet virtually every possible variation desired. The line is designed for high production lapping of moderate and small sized gears ($\frac{1}{2}$ to 8-in. diameter) and is not re-



Michigan Two-Lap Vertical Gear Lapper, designed for production of gears ranging from moderate size down to the smallest.



General view of Michigan No. 994 Horizontal Two-Lap Crossed Axis Gear Lapper. Work may be oscillated at rates up to 300 strokes per minute. Electric controls provide lapping cycle adjustments from 2 seconds to 20 minutes, forward and reverse.

stricted as to pitch of gears which may be lapped.

Fundamentally, the machines employ a relatively low surface speed, with high speed of reciprocation of the laps across the gear faces. By means of a single adjustment it is possible to vary this speed from 90 to 300 reciprocations per minute. A change-gear box is provided for the lap spindle, through which the latter may be operated at speeds ranging from 52 to 283 r.p.m. A third adjustment permits selection of desired reciprocating stroke length.

Two timers are provided to permit individual adjustment of desired lapping time on either side of the teeth, the range available being from two seconds to twenty minutes in either direction.

In operation, the two laps are mounted on the lap spindles, while the gear to be lapped is mounted between live centers between the laps. The lap spin-

die heads are adjusted to provide the correct mount of crossed-axis. Individual motor drives are used for driving lap spindles and for reciprocating the work. The former drives one lap spindle, the lap driving the work and the work in turn driving the second lap, whose spindle is equipped with an hydraulic brake. The second motor, through an eccentric drive, rapidly oscillates the work-carrying head in line with the axis of the gear.

With the timers set, starting the machine results in (1) revolving laps and spindle in one direction for the first preselected period, and (2) automatic reversal and lapping of the gear in the opposite direction for the second preselected period. The machine then stops automatically. One lap spindle is thereupon retracted by means of a hand lever, permitting removal of the lapped gear. Laps and gear will always mesh properly, eliminating damage to laps.

Lap spindle heads are provided with individual screw adjustments carrying graduated dials to facilitate set-up, while the movable spindle is also provided with adjustable stops to ensure bringing the lap to correct depth with reference to the work.

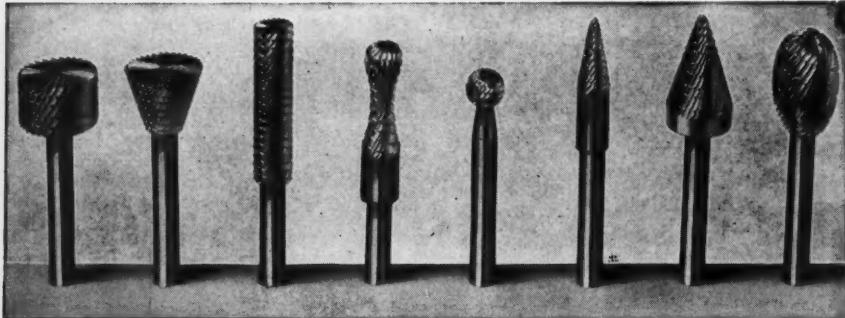
Lapping compound is supplied through a special pump. Lubrication of vital parts of the machine is through a manifold oiler, eliminating the necessity of individual oiling the various parts.

Norton No. 30 Semi-Automatic Cam-O-Lap

Because lapping plays such an extensive part in the manufacturing production of camshafts and crankshafts in the automotive industry, Norton Company, Worcester, Mass., is now offering an automatic camshaft lapper. The machine, to be known as the No. 30 Semi-Automatic Cam - O - Lap, will lap all the cams and bearings on any automotive camshaft simultaneously and automatically. All that is required of the operator is to place the work in the machine and move a lever. From then on everything is automatic including the engagement of the footstock in the work, lowering of the lapping arms, starting of the work rotation, timing of the actual lapping operation, and a complete reversal of these operations after the cams and bearings have been



FORD GROUND CUTTERS



Just a few of the many standard shapes which are carried in stock.
Write for full information.

M. A. FORD MFG. CO.
408 PERSHING AVE.

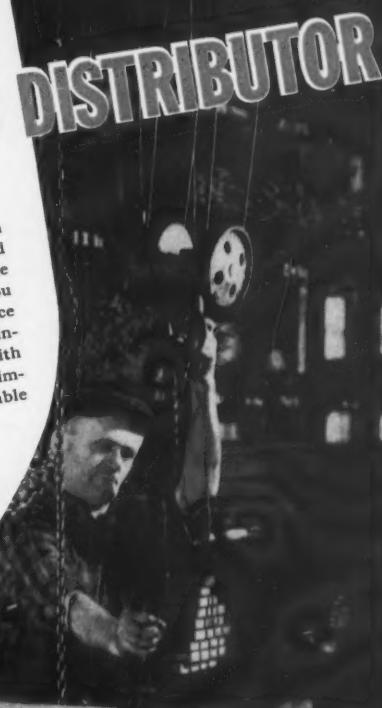
DAVENPORT, IOWA

WHY you should patronize your local UNION DRAWN DISTRIBUTOR

— primarily because he can save you worry
time and money.

He has invested thousands of dollars in
large stocks, including all popular sizes and
shapes of cold finished steel bars — reliable
bars of Union Drawn quality — so that you
need not tie up capital and valuable space
with surplus, slow-moving stocks. He main-
tains fast delivery service to supply you with
bars when you need them. And he is an im-
portant factor in making steel bars available
to small users at low cost.

Patronize your local Union
Drawn Distributor. He can
be a real asset to you.



UNION COLD FINISHED STEELS





Norton No. 30 Semi-Automatic Cam-O-Lap

finish lapped. The operator then does not have to move any lever to release the work from centers or stop the cycle; all that is necessary is to replace the shaft in the machine.

A protective hood, which is optional, may be placed over the machine so that grit or dust can not interfere with its efficiency. A convenient foot hole in the base allows the operator ample room.

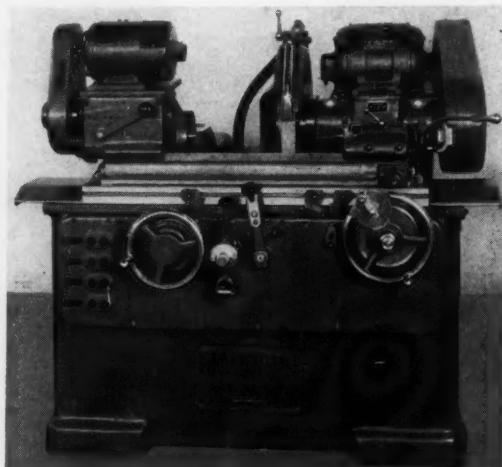
This type of machine has been manufactured to lap as many as 17 cams and 5 bearings simultaneously. Any type of automotive cam can be lapped with ease and one operator can work two machines. Two hundred and twenty-five complete camshafts per hour are now being lapped by one operator in two machines.

Norton 6-In. Grinding Machine

The Norton 6-In. Type C Cylindrical Grinder shown here has been redesigned by the Norton Company, Worcester, Mass., to give the utmost in rigidity, smooth appearance,

operating convenience, and accuracy. In addition, it has a capacity for higher production than hitherto attainable with machines of this size. All mechanisms are easily accessible for adjustment. Coolant and oil pumps are individually motor driven, run submerged, and are spring mounted. A separate pump supplies lubricant to the table and wheel slide ways.

Many improvements have been made on the headstock and footstock of the machine, including larger centers. The headstock has a new eccentric take-up of the drive chain for keeping it in proper tension at all times. The electrical controls are built into the back of the machine, cored openings in the base being provided for that purpose to keep it free from dust and grit. Protective telescoping guards are furnished for the base ways as standard equipment. Centralized controls make operation convenient and time-saving. The unit type construction which has been followed throughout the machine is efficient from the standpoints of adaptability and maintenance.



Norton 6-In. Grinding Machine



A CASE OF STANDARDIZATION

The fewer the different steels with which a foundry works, the simpler its operation, the better the techniques it develops—and the lower its costs. Standardization brings competitive advantages to the foundry, service benefits to its customers.

Molybdenum steels frequently make such standardization possible. For example, a large foundry uses cast Manganese-Molybdenum steel for an entire line of herringbone, single helical, and spur reducer gears up to 60 inches O.D. with hardness specifications ranging from 180 to 270 B.H.N. and corresponding variation in required strengths. With

this versatile steel, the specified hardnesses and physical properties are obtained simply by varying the heat treatment.

In addition, cast Manganese-Molybdenum, being free cutting at high hardness, permits machining of the uniformly sharp and even teeth required.

Molybdenum steels, both cast and wrought, are keeping down costs and bettering performance in many such cases. Our book, "Molybdenum in Steel," giving practical data, will be sent free on request to production executives and engineers.

Visit our booth, L-334, at the National Metal Exposition, October 23-27 in Chicago

PRODUCERS OF MOYBDENUM BRICKS, FERRO-MOYBDENUM, AND CALCIUM MOYBDATE

Climax Molybdenum Company
500 Fifth Avenue New York City

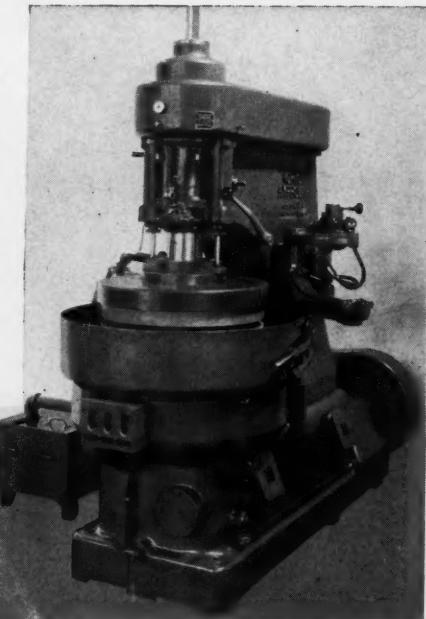
Norton No. 26 Hyprolap

Norton Company, Worcester, Mass., announces a Norton Hyprolap machine to be known as the No. 26. It uses two bonded abrasive laps and is an extremely fast cutting machine, the number of parts finished simultaneously in one load depending on their size. Automotive parts, such as piston rings, refrigerator parts—in fact, any flat part the size of which is within the machine's capacity—can be finished flat and parallel within extremely fine, pre-established limits.

The machine can be adapted for either flat or cylindrical work. A lever regulates the lapping pressure which can be adjusted for from 20 to 100 lbs. per square inch. A hydraulically controlled swinging arm carrying two diamonds trues the upper and lower lap faces simultaneously.

Norton 5 x 30-In. Cam-O-Matic

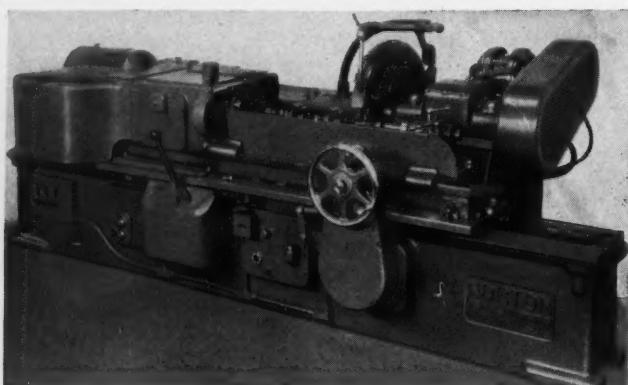
One of the principal features of the automatic cam grinder illustrated here and developed by Norton Company, Worcester, Mass., is the manner of feeding. All machines of this type hitherto have fed the grinding wheel into the work. Because of the frequency of contacts between wheel and work, the ways of the relatively heavy wheel unit are subjected to a large amount of service. Furthermore, a consideration of the inertia of the slide be-



Norton No. 26 Hyprolap

comes very important and requires that the design of the propelling elements be such as to withstand this constant movement back and forth.

With the Norton Cam-O-Matic the lighter member is operated frequently. Furthermore, a standard 10-in. Type C wheel unit can be employed, thus simplifying manufacturing. This feed is accomplished with an eccentric master cam roll shaft which is rotated through part of one revolution by an oil motor. Cam size is obtained when the eccentric motion of the roll shaft is arrested by a positive stop, this also



Norton 5 x 30-In. Cam-O-Matic

YOU CAN **EXPECT MORE** FROM A
STANLEY ELECTRIC TOOL



SET UP FOR
PRODUCTION
with STANLEY ELECTRIC
SCREW DRIVERS



In these typical production applications of Stanley Electric Screw Drivers, the operator merely guides the work—the screw driver does the job.

It's flexible and operates smoothly because Stanley Electric Screw Drivers have an "adjustable tension clutch" that releases automatically at any set tension.

There's a time, labor, and power saving suggestion for you in the new folder, "Facts on Stanley Electric Screw Drivers". Write for a copy and tell us where we can demonstrate on your particular assembly work. Stanley Electric Tool Division, The Stanley Works, 137 Elm Street, New Britain, Connecticut.



STANLEY ELECTRIC TOOLS
"COST LESS PER YEAR"



being the position of the roller with relation to the grinding wheel when the master cams are generated. By this method an extremely fine feed can be obtained, a feature of the utmost importance.

Timing of the cycle is controlled from the revolution of the shaft and the oscillation of the rocking bar which supports the master cams and the product. Each cam makes the same number of revolutions in contact with the grinding wheel and this number is readily adjustable by turning a simple knob conveniently placed for the operator or set-up man. Termination of the grinding cycle is governed by a limit switch operated by a cam in the timing unit. The cycle can also be interrupted at any time by a push button.

The machine is quiet in operation and is controlled primarily by a single lever and a push button to start the work. Steadyrests are opened or closed with one hand.

Oil and coolant pumps are individually motor driven, are spring mounted to prevent the transmission of vibration, and run submerged. All electrical controls are built in a cored receptacle at the rear of the base, thus isolating them from dust or moisture.

Van Norman No. 2-L Light Model Milling Machine

Announcement has been made by the Van Norman Machine Tool Company,



Van Norman No. 2-L Light Model Milling Machine

Springfield, Mass., of the fourth new milling machine to be placed on the market by this firm within the last two months—the No. 2-L, a light model milling machine, plain or universal. This miller features a modern design that embodies exceptional rigidity and dependability. Noteworthy in the design are front and rear controls, six-

SHELDON
Back Geared
Screw Cutting
PRECISION LATHES

A complete line of full size, full weight 10", 11" and 12" Precision Lathes...bench, floor and pedestal types built to industrial machine tool standards and specifications. Rigid, heavily braced, semi-steel beds with hand scraped ways—2 "V"-Ways and 2 Flat Ways. Large hardened steel spindles, ground all over and individually fitted into hand scraped bearings. Each lathe has a full complement of attachments and accessories. Each model gives more lathe per dollar.

See the SHELDON before you buy.

SHELDON MACHINE CO.
1628 N. Kilbourn Ave. Chicago, U. S. A.



Here's a
**BETTER
W A Y**

... The Cincinnati General Purpose Grinders. They set a new high standard for economical production . . . Motors are fully enclosed, dirt and dustproof. Wheel guards fully enclosed and adjustable. Push button starter with overload protection. Extra heavy pedestal. Large tool tray and water pot.

Write for descriptive folder on
**THE CINCINNATI General Purpose
Grinders and Buffers.**



Type
GPTA

The Cincinnati
Pedestal
Grinder

Electric Drills
Screw Drivers
Nut Setters
Tappers
Aerial Grinders
Tool Post Grinders
Bench and Ped- estal Buffers
Bench and Ped- estal Grinders
Abrasive Cut-off Machines

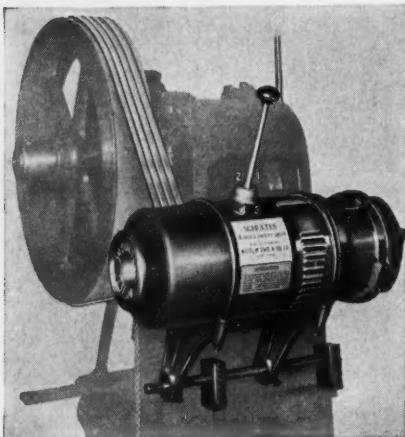
ELECTRIC DRILLS • GRINDERS • BUFFERS • PORTABLE TOOLS
The Cincinnati Electrical Tool Co.

DIVISION OF THE E. F. HILLON MACHINE TOOL CO.

2808-4 MADISON RD.
CINCINNATI, OHIO

4 SPEED SCHULTES UNIT

Instant Reversibility



Features:

For punch presses, lathes, shapers, milling machines, drill presses, etc. One lever controls 4 speeds.

Instant reversibility with all 4 speeds. Adapted to V-belt, flat-belt, chain or direct drive.

Hand wheel permits rotation of machine spindle for set-up work with complete safety.

Cradle adjustment permits the unit to be revolved to any desired position... placing gear shift lever where most convenient.

Write for illustrated folder

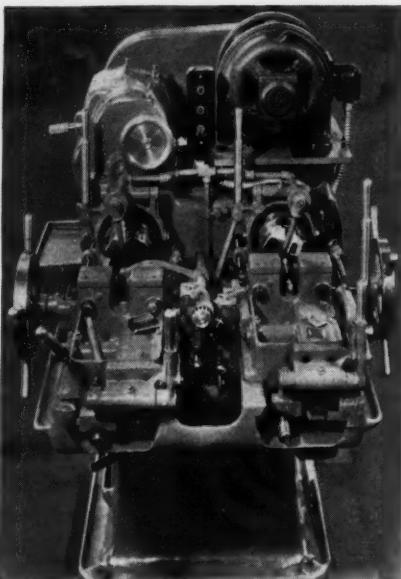
WESTLOF TOOL & DIE CO.
430 BELLEVUE AVE. DETROIT, MICH.

way rapid traverse, wide range of speeds controlled by a single-lever selector, and a high degree of precision, sensitivity, accuracy, and compactness.

The No. 2-L has 18 spindle speeds from 30 to 1,450 r.p.m., and 12 table feeds from $\frac{1}{8}$ to 36 in. Table size is 45 x 10 inches.

Landis $\frac{7}{8}$ -In. Turning Machine

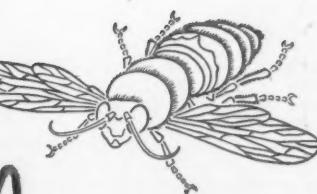
The illustration shows a $\frac{7}{8}$ -in. double head machine which was recently equipped by Landis Machine Company,



Landis $\frac{7}{8}$ -In. Turning Machine

Waynesboro, Pa., for a combination pointing, beveling, turning, and facing operation. The machine is the standard Landis $\frac{7}{8}$ -In. Double Head Threading Machine equipped with lead screws and with $\frac{7}{8}$ -In. Lanco Hardened and Ground Heads. To this standard machine have been added several fixtures which make it possible to handle the special turning operation efficiently and economically.

The special fixtures include the milling cutters, which replace the usual chasers, a spring-actuated tool holder to carry the pointing and beveling tool



The
WILSON
"HORNET"**

a NEW single-pole control arc welding generator

Wilson, a pioneer manufacturer of arc welding machines, now presents the "Hornet" . . . a new line of welders which has the smoothest, steadiest arc obtainable with a welding generator. The "Hornet" assures uniform, smooth, uninterrupted current flow . . . gives quick recovery . . . absolutely prevents accidental reversal of polarity. This assurance of an unvarying current flow

enables the "man in the helmet" to give undivided attention to his work . . . to make better welds. The new "Hornet" is available in 200 ampere, 300 ampere and 400 ampere motor generator units—all "Hornets" liberally meet NEMA standards in every respect. Write for full information and a copy of the new "Hornet" booklet on . . . "the machine that stings high welding costs."

WILSON WELDER
 and METALS CO., INC.

General Offices: 60 East 42nd Street, New York, N.Y.



SEE THE "HORNET"
 Booth M-319
 National
 Metal Exposition
 Chicago, Oct. 23-27

DISTRIBUTED THROUGH AIR REDUCTION SALES COMPANY'S DISTRICT OFFICES IN PRINCIPAL CITIES

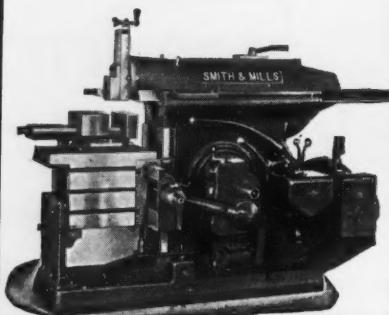
(two of these special tools are shown on the right hand carriage of the machine), and the automatic work stop for positioning the work in the vises. Special milling cutters can be used for reducing the body diameters of long length bolts, or cutters for a combination turning and shoulder facing operation can be substituted for the regular milling cutters.

The pointing and beveling tools are carried in a holder which extends entirely through the spindle. The holder can be adjusted, at the rear of the

spindle, to permit the turning, pointing, and beveling of work for a length of 5 inches.

The efficiency of handling turning operations on a machine of this type is said to greatly increase production possibilities; and, likewise, the accuracy of the finished product is much improved. The four milling cutters operating in a single plane about the axis of the work assure a uniform cutting action that produces a perfectly round turning job. The machine can also be used for threading if desired.

SMITH & MILLS SHAPERS



Automatic lubrication—forced feed. Multiple disc clutch and brake. Quick feed changes. Direct reading feed and stroke dials. Power rapid traverse to cross feeds.

THE SMITH & MILLS CO.
CINCINNATI • OHIO

Ex-Cell-O Style No. 33 External Precision Thread Grinder

One of the three new precision thread grinders introduced by Ex-Cell-O Corporation, 1206 Oakman Blvd., Detroit, Mich., is a No. 33 external, for grinding threaded sections up to 6 in. in diameter, 8 in. long, on work up to 18 in. between centers. An improved taper attachment permits grinding up to 3 in. included taper per foot.

The grinder is self-contained, electrically operated and controlled, and uses 18-in. wheels running in oil coolant. It grinds continuous and multiple right and left hand threads with any pitch from 1 to 80 per inch. Most standard threads can be produced on this machine directly from solid, hardened blanks on a production basis.

The machine has a manual retracting lever which enables the operator to retract the grinding wheels for removing the finished workpiece and reloading. At the start of a new grinding cut, the retracting lever can be positioned for a single cut or a succession of cuts to finish size without disturbing the finish size setting of the wheel slide.

ABRASIVE
Surface Grinders

QUALITY • ACCURACY • DURABILITY • ECONOMY

WRITE FOR PARTICULARS

ABRASIVE MACHINE TOOL CO.

EAST PROVIDENCE, R. I.

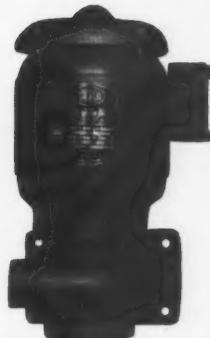


CENTRIFUGAL COOLANT PUMPS AND BY-PASS OIL RELIEF VALVES

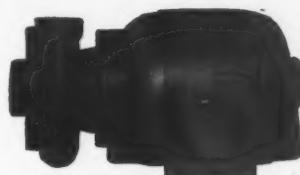
The ideal, efficient units for installation where space is limited.

These compact, quiet units can be depended upon for long life and high efficiency.

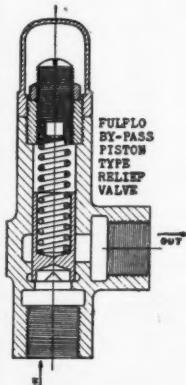
Flexibility in installation is assured through ability to provide for exactly the position of discharge required.



Symbol FVM
Vertical Type



Symbol FHM
Horizontal Type



The Fulflo By-pass Piston Type Oil Relief Valve is made in either cast iron or bronze, with pipe sizes from $\frac{1}{4}$ " to $1\frac{1}{2}$ " and are suitable for pressures up to 350 lbs. They are equipped with either brass, hardened steel, or stainless steel pistons.

*(Complete Information of the "Fulflo"
Line Sent Upon Request)*

THE FULFLO SPECIALTIES CO., INC.
BLANCHESTER • OHIO



Ex-Cell-O No. 33 External Precision Thread Grinder

driving the table, reproduces its lead, or pitch, on the workpiece with extreme accuracy. A lead pick-up, or positioning, device permits locating previously roughed threads in correct relation to the grinding wheel.

The grinding wheel spindle is mounted at each end in Ex-Cell-O precision ball bearings, so closely fitted that end play in the wheel spindle is entirely eliminated. Adjustable table dogs automatically control the reversal of the table and the change in work spindle speeds. The table can be adjusted to stop automatically after one pass, or to reverse and run continuously.

For high production runs on a wide range of workpieces, an electrically operated and controlled automatic feed attachment can be provided. While the table and work spindle momentarily stop at the end of table travel, the wheel is fed into the work, and after the desired work size setting is reached,

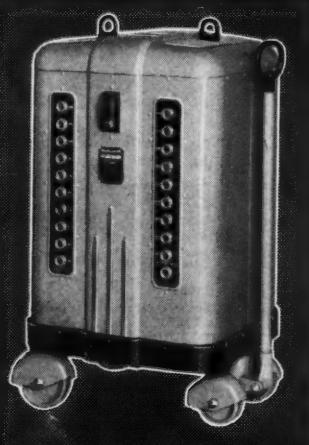
Lead accuracy is assured by the use of interchangeable master lead screw and nut assemblies like those used for years on the Ex-Cell-O Style No. 31 Thread Grinder. The extremely accurate master lead screw is mounted on the rear end of the work drive spindle, and,

MARQUETTE Quality WELDS at LOW COST

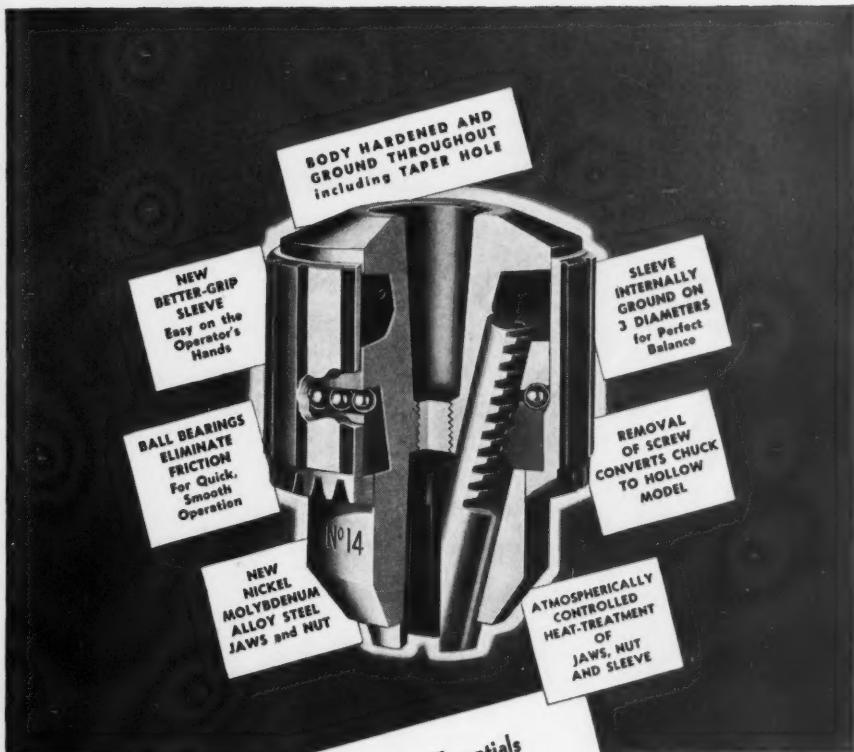
THE MARQUETTE A. C. ARC WELDER

QUALITY WELDS...you will get better welds with any of the five Marquettes. Welds which will pass your strict requirements thus cutting out costly rejects. The alternating current eliminates "magnetic blow" and agitates the molten metal forming a stronger and more dense weld. A. C. welding is by far the best method of joining or building up metal parts and the Marquette is the FASTEST SELLING A.C. WELDER IN THE WORLD.

LOW COST...save three ways with a Marquette. The low original cost saves on your original investment. The low operating cost (power savings up to 15% over comparable D. C. machines) plus negligible idling time loss (idles on 5% of regular power consumption) gives you additional savings. The absence of maintenance costs...there are no moving or rotating parts to wear out...are your third saving. For complete details write Dept. E. Marquette A.C. Welders are listed by Underwriters' Laboratories, Inc.



MARQUETTE
MANUFACTURING CO., INC.
MINNEAPOLIS, MINNESOTA



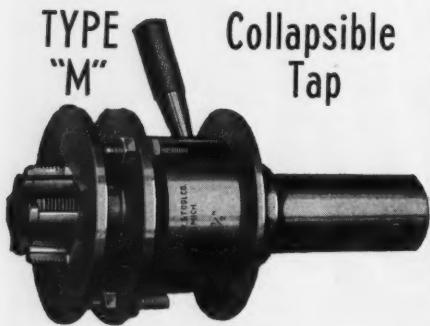
You get the 4 Chucking Essentials
**ACCURACY — GRIPPING POWER
 SPEEDY OPERATION — DURABILITY**

when you insist on this new
Jacobs BALL BEARING
Super Chuck!

**JACOBS — the world's
 largest producers of
 DRILL CHUCKS! .**

THE JACOBS MANUFACTURING COMPANY
 HARTFORD CONNECTICUT, U. S. A.

★ NEW Murchey



A universal machine tap that can be used as a stationary tap with handle or as a rotating tap by removing handle. Instant trip at set point.

Chasers are rigidly supported and are hooked into tapered seat of the hardened and ground center pin to insure positive opening and closing.

May we send folder?

MURCHEY MACHINE & TOOL CO.
DETROIT • MICHIGAN

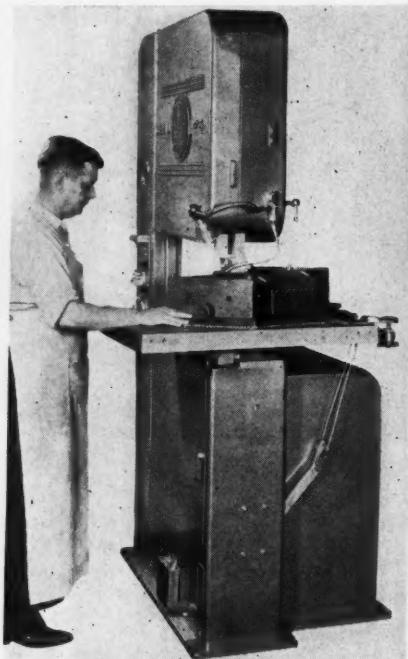
Also Self-Opening Die Heads, Bolt and Pipe Threading Machines, Pipe Cutting-off Machines, Double End Reaming, Chamfering and Drilling and Threading Machines.

the machine stops automatically.

A back-off attachment is available that can be adjusted for the amount of back-off desired. It is conveniently connected or disconnected, for changing over from back-off to plain grinding.

"Doall" 26 Contour Shaping Machine

The illustration shows the "Doall" 26 Contour Shaping Machine, which was brought out by Continental Machines,



"Doall" 26 Contour Shaping Machine

Inc., 1306 S. Washington Ave., Minneapolis, Minn., especially for presentation at the Machine Tool Show. The Doall 26 is of rugged, arc welded steel construction which makes possible the modern, streamlined appearance, and has a 26-in. throat depth.

The machine has a 30 x 30-in. work table of strong box-type construction and can employ precision band saws

QUIETER, SMOOTHER-RUNNING *because of* **FORMICA GEARS**

Formica pinions on motors have made electrically driven equipment much quieter, and Formica gears at important points in the machine, have absorbed noise and shock to produce greater durability and smoother operation.

This improvement is a selling force of importance to the machinery manufacturer, and a great help to the maintenance man. Hence the growing number of machines on which Formica gears are standard equipment, and the increasing use of Formica for replacement purposes.

Any of the gear cutters named can give you prompt service on replacement gears.

**THE FORMICA INSULATION CO.
4673 Spring Grove Ave.** Cincinnati, O.

FORMICA

FORMICA GEAR CUTTERS

- The Akron Gear & Eng'g Co., Akron, Ohio
- Farell-Birmingham Co., Buffalo, N. Y.
- Slaysman & Company, Baltimore, Md.
- Harry A. Moore, Bangor, Maine
- The Union Gear & Mch. Co., Boston, Mass.
- Chicago Rawhide Mfg. Co., Chicago, Ill.
- Prefect Gear Co., Chicago, Ill.
- Gear Specialties, Inc., Chicago, Ill.
- Merkle-Korf Gear Co., Chicago, Ill.
- Chicago Gear Works, Chicago, Ill.
- Foote Gear Works, Cicero, Ill.
- The Cincinnati Gear Co., Cincinnati, Ohio
- Clarkson Foundry & Machine Co., Clarksville, Tenn.
- The Horsburgh & Scott Co., Cleveland, Ohio
- The Stahl Gear & Machine Co., Cleveland, Ohio
- The Motor Electric Co., Dayton, Ohio
- Beal Foundry & Machine Co., Ft. Smith, Ark.
- C. A. Lawton Company, DePere, Wis.
- The Allis-Chalmers Co., Dubuque, Iowa
- Hoell Machines Co., Green Bay, Wis.
- Hartford Special Machinery Co., Hartford, Conn.
- Bentley Gear Works, Koshub, Pa.
- The Generating Gear Co., Milwaukee, Wis.
- Badger State Gear Co., Milwaukee, Wis.
- Precision Machine Co., Milwaukee, Wis.
- E. E. Ryan Co., Minneapolis, Minn.
- Joaquin Alemany Lopez, Havana, Cuba
- The SES Machine Works, Kansas City, Mo.
- Kennedy & Bowdier, Nashville, Tenn.
- Natitsch Gear Works, Brooklyn, N. Y.
- New Jersey Gear Co., Newark, N. J.
- Parrish, Inc., New Orleans, La.
- J. Morrison Gilmore, New York City, N. Y.
- Ster-Bath Inc., New York City, N. Y.
- Mid-State Electrical Engineering Co., Oconto Mills, Pa.
- Puritan Machine Co., Omaha, Neb.
- E. M. Smith Machine Co., Procton, W. Va.
- The Express Wheel Machine Co., Philadelphia, Pa.
- The Pittsburgh Machine & Supply Co., Pittsburgh, Pa.
- Perkins Machine & Gear Co., Springfield, Mass.
- Winfeld H. Smith, Inc., Springfield, N. Y.
- Alling Lander Company, Sodus, N. Y.
- Charles E. Crofoot Gear Corp's., South Easton, Mass.
- Arlington Gear Co., St. Paul, Minn.
- Farwell Mfg. Co., Toledo, Ohio
- Difendorf Gear Corp., Syracuse, N. Y.
- Bates Cook Co., West Seneca, N. Y.
- Wester Gear Works, Worcester, Mass.
- Massachusetts Gear & Tool Co., Woburn, Mass.

of any width from 1 mm. up to and including 1 in. File bands $\frac{1}{2}$ in. wide can also be used in addition to the $\frac{5}{8}$ in. wide and $\frac{3}{4}$ in. wide bands.

One of the features of the machine is a newly designed automatic power work feed which not only exerts pressure on the saw but throughout the contour as well. Any curve can be cut by hand wheel control, no hand pressure being required. The automatic feed not only makes possible perfect accuracy and smooth workmanship, but also amplifies the capacity of the machine. The machine table can be inclined in any direction, forward, rearward, or sideways. The maximum tilt is 45 deg., permitting the cutting of any angle.

A frictionless cutting attachment permits easy machining of heavy work. The machine is massive and rugged, weighing over 2,000 lbs. A 1 $\frac{1}{2}$ h.p. motor drives the machine through a Continental Speedmaster molded bakelite variable drive and silent transmission. Speed range from 50 to 1,500 linear feet per minute is provided, the exact speed being indicated on a tachometer dial. The correct speed and

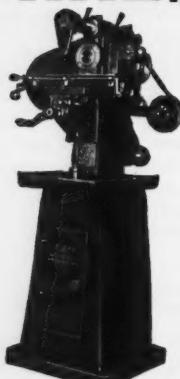
type of saw or file to use for 48 materials is given on the Job Selector Dial on the machine.

The size of the table is 30 x 30 x 2 $\frac{1}{4}$ in. and the distance from table to floor is 44 in. Maximum work thickness capacity, 10 in. Upper wheel adjustment, crank wheel, 10-in. range. Length of saw, 173 in. Length of file band, 165 in. Floor space required, 45 x 30 in. Ball bearings are used throughout and an automatic electric butt welder is built in.

Baker Model No. 5 x 12 Self-Contained Drill Unit

Baker Brothers, Inc., Toledo, Ohio, are now offering a compact hydraulic feed drilling unit which is said to have unusual features. The unit is very flexible with easy adjustment of feeding lengths and feeding rates. It is adapted to single spindle and multiple spindle drilling, boring, reaming, counterboring, hollow milling, chamfering, and facing operations. The feature of the unit is a variable delivery pump which requires a minimum of power,

BURKE Milling Machines

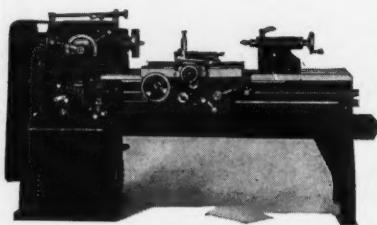


Burke motor driven milling machines, Nos. 1, 2, 3, and 4 are specially suited for handling small, difficult work on a production basis.

Write for complete information.

BURKE MACHINE TOOL CO.
297 E. 16TH ST. CONNEAUT, OHIO

New "C & J" 15" and 16" Lathes



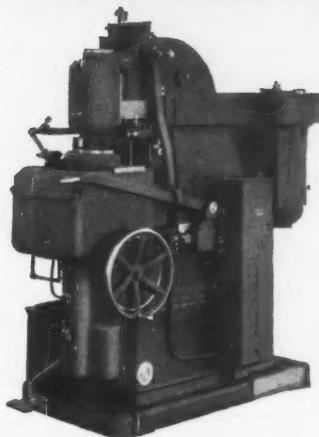
12 Speed Geared Head-Motor Drive
Timken mounted spindle
Modern Design—Liberal Dimensions
Write for bulletin.

The Carroll & Jamieson Machine Tool Co.
BATAVIA • OHIO, U. S. A.

WALKER

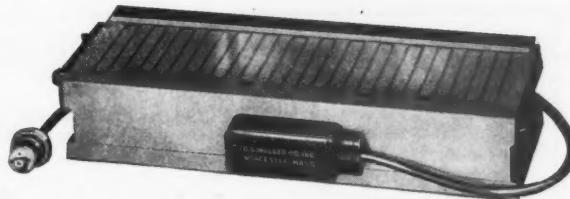
IMPROVED ROTARY SURFACE GRINDER

Raising or lowering wheel head automatically starts or stops the table and magnetizes or demagnetizes 12" magnetic chuck. Other features include wheel head locking device and adjustment of upper portion of column for grinding saws, cutters, etc., having hubs up to 6" diameter. Six table speeds are available and a foot brake facilitates quick stopping of table.



MAGNETIC CHUCKS

Right—No. 618 Standard Type Rectangular Magnetic Chuck. Available in sizes 4 x 8 to 30 x 96.



STANDARD ROTARY CHUCKS

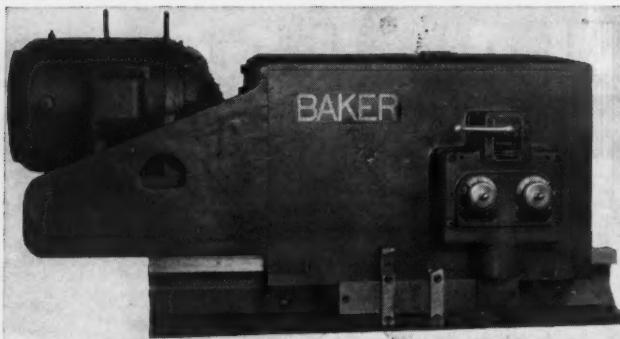
6" TO 36" DIAMETER

Style D (right) for thin, small work, as well as for general grinding. Style B (left) is ideal for work of average size and thickness. Four standard styles, all interchangeable.

Ask for circulars.



O. S. WALKER COMPANY, INC.
WORCESTER • MASS.



Baker Model No. 5 x 12 Self-Contained Drill Unit

allowing practically all of the power to be applied to the unit. As standard, the unit is furnished with a two-feed cycle. Positive stop and delayed reverse can be supplied.

Maximum feeding pressure available is 4,000 lbs. Maximum head travel, 12 in. Length of saddle, 26 in. Width of ways of bed, 9 in. Distance from top of slide to centerline of driving

spindle for multiple heads, 7.250 in. Speed range of main driver for multiple head application, 400 to 1,200 r.p.m. Rapid traverse speed forward, 174 in. per min.; return, 232 in. per min. Spindle of extension head has No. 4 taper. Speed range of spindle and extension for single spindle operation, 200 to 500 r.p.m. Overall length of unit with direct coupled motor drive with head in back position, 62 inches.

The driving motor can be mounted on a bracket at the rear of the unit with a direct coupled drive, or mounted on the top of the unit with a multi-V-belt drive. The unit is flexible for application, and can be mounted vertically, horizontally, or at an angle.

TOLEDO

Designed for economy and efficiency . . .
Designed for maximum rigidity, this Saw is accurate and efficient in operation. Automatic trip stops the machine on completion of the cut. Automatic relief of the saw blade on the non-cutting stroke is also provided. To make a clean and compact assembly, the coolant pump is mounted inside the base. Capacity is 6" x 6" with 14" blade.

Save Money On

Lathe Chucks	Milling Machine Vises
Dividing Heads	Power Hack Saws
Demagnetizers	Magnetic Chucks

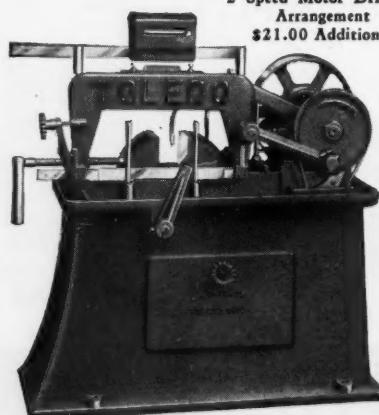
Best Values ever offered!

Send Today for NEW free catalog

L-W CHUCK CO.
20 N. ST. CLAIR ST. TOLEDO, OHIO

POWER HACK SAW NOW ONLY \$147.50

2 Speed Motor Drive
Arrangement
\$21.00 Additional



multi-
250 in.
ge of
er for
ad ap-
400 to
Rapid
speed
4 in.
return,
min.
exten-
as No.
Speed
indle
on for
e op-
to 500
r all
unit
cou-
back

ed on
with
ed on
Y-belt
aplica-
cally,

INTRODUCING THE *New STOW Junior* FLEXIBLE SHAFT MACHINES

For as little as
\$35.00
f.o.b. factory

Featuring Quality at a LOW Price

The new STOW Junior is compact, light-weight, perfectly balanced, sturdily-constructed and low priced! It is a wide-utility Flexible Shaft Machine that you can depend on, for it is a worthy companion to the famous "STOW" Heavy-duty unit. From this well-known quality construction, various features of this new popular price line have been patterned.

Careful designing of each unit for its specific requirement, plus manufacturing economies through standardization and increased volume, have made possible lower prices — under a quality policy which has built STOW'S reputation since 1875.

Write direct for full details of STOW'S
VALUE achievement — the new
Junior line. We
will send you the
name of your
nearest dealer.

**WIDE LIST
OF USES**
GRINDING
FILEING
WIRE BRUSHING
SANDING
POLISHING
BUFFING
DRILLING
For almost every
type of industry.

STOW
MFG. CO., INC.
30 Shear St. Binghamton, N.Y.

Established since 1875 — Inventors of Flexible Shafts

complete with motor, switch, extension
cord and plug, flexible shaft and clamp
spindle.

- *Rugged oversize flexible core; tough, oil-resistant rubber outside casing.
- *Motor-end of shaft reinforced to insure uniform curvature. Oelite bearings.
- *Hand piece; ball bearings, labyrinth oil-seal. Removable Clamp Spindle.

Also manufacturers of Stow Heavy-Duty Flexible Shaft Machines for high-volume production operations.

As illustrated
\$44.50
f.o.b. factory

Pedestal Type . . . Suspended Type
. . . Combination Type . . .
. . . Multi-Speed Type. Full
line of attachments.

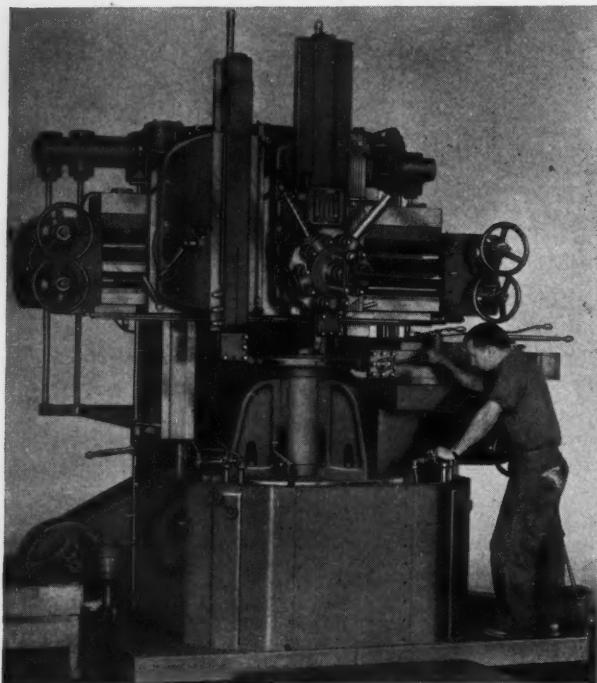
Bullard "Cut Master" Vertical Turret Lathe

Shown herewith is the Bullard "Cut Master" Vertical Turret Lathe — the newest addition to the line of vertical turret lathes built by The Bullard Company, Bridgeport, Conn. The machine is made in five sizes of 30, 36, 42, 54, and 64 in., and is intended both for short

to carry three heads — left hand main ram head, right hand main turret head, and side head. Any combination of these heads, including left and right hand ram heads with or without side head, is available. All heads and functions of the machines are protected by interlocking and limit switch, making it impossible to damage the machine through careless handling.

Either rail head may be swivelled 30 deg. either side of vertical center, and the heads can also be fed horizontally while their respective rams are being fed vertically at the same time for machining any angles up to 45 deg. The two main heads are provided with screw feed, both horizontal and vertical, assuring extreme accuracy, smoothness of movement, and fine finish on the work in process.

Operating functions have been greatly simplified. Traverse and feed control have been combined in one lever in the center of each handwheel, one for the turret slide and another for the saddle movements, providing a natural interlock which prevents feed and traverse from being engaged simultaneously. Each head has an individual feed and feed changes are easily and quickly



Bullard "Cut Master" Vertical Turret Lathe

runs and production jobs upon which standard tools are used. The machine has been designed with four objectives in mind; ability to reduce time between cuts to the minimum, ability to handle cuts of any depth, feed, or speed required without loss of accuracy, ability to work within fine limits of accuracy, and maintenance of accuracy throughout long machine life.

With the exception of the 30 and 36-in. machines, which alone are designed for two heads (main turret head and side head), these machines are designed

made. Electric stops are provided for feeds of all heads in all directions. Moving members are equipped with fixed switches which contact the adjustable trip dogs at the point of setting, closing a circuit and reacting on thrustors which, in turn, disengage the feed. The turret head carries a selector bar which permits of separate trip dogs for each station of the turret. As the turret is revolved, the stops are automatically indexed, thereby permitting extremely accurate duplication of work.

There are 16 changes of feeds and 20



16 DIES in 15 DAYS

**THAT'S THE KIND OF RUSH
SERVICE YOU CAN EXPECT FROM
DAYTON TOOL**

It was on a Monday morning when we received this unusual rush order...sixteen large and irregular shaped dies (blank dimension 30 x 24—16 gauge material) with a positive delivery date of fifteen days. It looked tough...it *was* tough...but in exactly two weeks and one day the entire order was accurately completed and shipped to the customer.

When you are in a jam and need similar rush service, give your tool work to the Dayton Tool and Engineering Co. Your order will be handled with the same speed and skill that has had much to do with the rapid growth of Dayton Tool.

But even if your order isn't tagged "rush," the services and facilities at Dayton Tool are still worth considering. Write today for free descriptive bulletin, read it, and then let us quote on your next tooling job. No obligation, of course.
The Dayton Tool and Engineering Co., Dayton, Ohio.

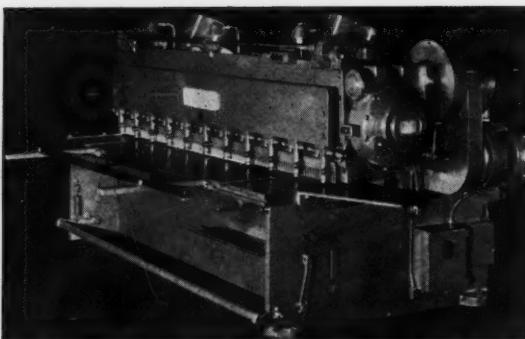
The DAYTON TOOL & ENGINEERING CO.

ACCURATE TOOLS DELIVERED ON TIME

changes of speeds, in geometric ratio. Timken bearing spindle mountings make it possible to safely operate these machines at higher speeds and a spindle speed range of 25 per cent higher than normal can be provided if desired. Positive pressure filtered lubrication throughout the machine and anti-friction bearings at all points of heavy load assure long life with minimum maintenance even under the heavy cutting or high speeds to which the machines can be subjected. Chucks of a design which minimizes friction within the mechanism, increasing efficiency three times, are available in three-jaw universal or four-jaw independent types.

Power Back Gauge for Cincinnati All-Steel Shear

Savings in operator's time, greatly increased gauging speeds, and fine ac-

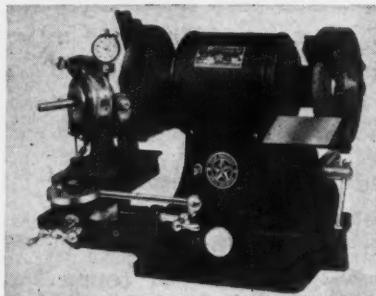


Cincinnati All-Steel Shear Equipped with Power Back Gauge

curate settings are the important advantages of the front controlled power back gauge which The Cincinnati Shaper Company, Cincinnati, Ohio, now provides as optional equipment on its All-Steel Shear.

Finger tip push button control is from the front of the shear, conveniently located at the operator's position. Dials reading in inches and sixty-fourths or finer are mounted in front above the

TRIM YOUR DRILL COSTS



with a
**STAR PRECISION
DRILL GRINDER**

Produces perfect points on
drills No. 41 to 5/8" inc.

Write for Descriptive Folder.

STAR MACHINE & ENGINEERING CORP.

Division STAR ELECTRIC MOTOR CO., Bloomfield, N. J.

Ettco - Emrick

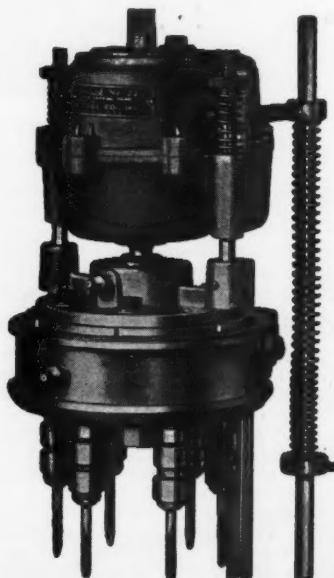
TAPPING ATTACHMENTS

THE EXACTING REQUIREMENTS OF TAPPING IS UP TO THE FRICTION CLUTCH.

ETTCO PIONEERED SENSITIVE TAPPING WITH A LEATHER LINED FRICTION CLUTCH. AS YET WE HAVE FOUND NO SUBSTITUTE TO EQUAL ITS SMOOTH, SENSITIVE ACTION. IT SAVES TAPS, LASTS LONGER AND INSURES ACCURATE HOLES.



SEVEN SIZES
FROM THE
FINEST TO
1" TAPS



MULTIPLE SPINDLE TAPPING HEADS "A STANDARDIZED SYSTEM"

ETTCO HEADS ARE A MANUFACTURED PRODUCT ASSEMBLED TO FIT YOUR NEEDS.

DELIVERY IS FAST, SERVICE IS FROM STOCK PARTS, THE COST IS LOW AND YOUR JOB IS FROM 100 TO 500% FASTER.

LET US HAVE A PRINT OR PART OF YOUR SMALL PARTS — WE WILL BE PLEASED TO SEND A STANDARDIZED QUOTATION.

ETTCO TOOL CO.

596 JOHNSON AVE. • BROOKLYN, N. Y.



Universal

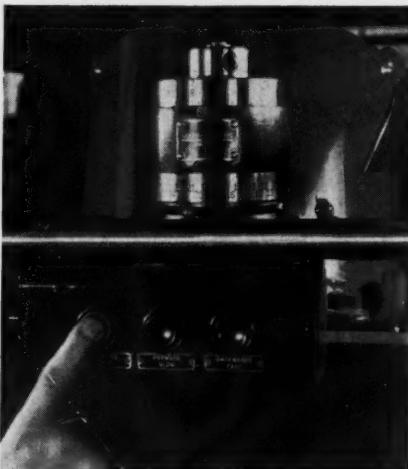
IS AT YOUR SERVICE

There's no hold up on your Universal orders. In our stock room we have the world's largest and most complete stock of A.S.A. standard drill bushings. Universal bushings with their superfinished bores—straight and round within .0001—are more accurate and wear longer.

UNIVERSAL
Engineering Company
Frankenmuth, Mich.

finger tip control. A fast forward and a fast backward speed give rapid movement to the desired position. A "spotting" button sets the gauge accurately.

The gauge is especially advantageous in work requiring frequent changes of



Control Mechanism for Power Back Gauge on Cincinnati All-Steel Shear

back gauge setting. Under such conditions the device pays for itself in a very short time.

Sundstrand 2 H.P. Oil Power Variable Speed Transmission

The Sundstrand Machine Tool Co., Rockford, Ill., announces a 2 h.p. oil power variable speed transmission especially designed for machine tool applications. It provides a speed range steplessly variable from 10 to 3,000 r.p.m. and is suitable for either speed or feed drives.

The transmission is small and compact with a multiple piston pump mounted below an oil power fluid motor of the same type. This arrangement requires less space than putting the motor and pump in line.

The controls are simple and extremely flexible. Features are an exceptionally high overall efficiency with high starting torque at low speeds. There is no power loss in accelerating from



NOPAK AIR CONTROL VALVES

*engineered to
improve with
use!*

Simple, Rugged Design for Efficient, Satisfactory Service

THE NOPAK patented, flat-disc principle results in highly simplified design, rugged construction, no wearing parts! The flat bronze disc is ground and lapped to make a perfect seal with the seat. This exclusive NOPAK feature continues the uniform "lapping-in" process while the valve is in operation. The result... absolutely leakproof sealing surfaces that actually improve with use!

The packless stem assembly positively prevents air or pressure loss through stem leakage... eliminates packing replacement, maintenance service and expense.

Simple, rugged, Packless, Flat-Disc construction is the basic patented feature embodied in all models of NOPAK Valves. It is your guarantee of long-lived, low cost, trouble-free valve operation whether you specify NOPAK Valves for Air, Gas, Oil or Water — or for heavy Hydraulic Service.

GALLAND-HENNING MFG. CO.
2758 S. 31st STREET
MILWAUKEE, WIS.

NOPAK FEATURES

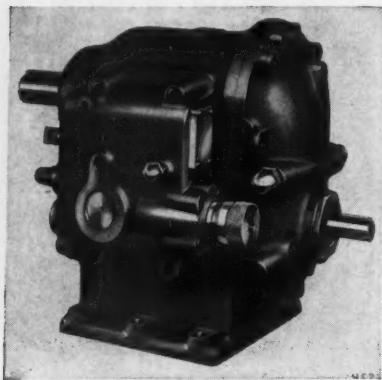
- No Air Loss thru Valve Leakage
- Packless Construction —no maintenance
- Pressure Sealed
- Protected, wear-proof disc and seat
- Quick or throttling action, as desired
- Full pipe area thru Valve.

Write for Bulletin 65.

NOPAK VALVES
and CYLINDERS

A 2789-1/2

standstill to maximum speed or in starting and stopping. No valves are used in reversing, and there are no



Sundstrand 2 H.P. Oil Power Variable Speed Transmission

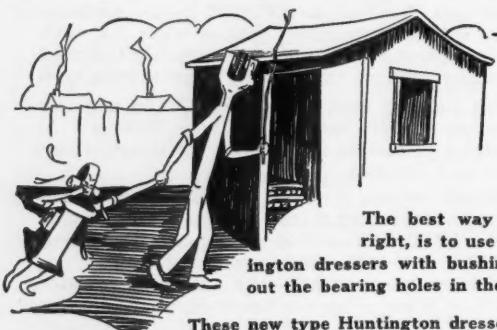
rotary valves. Pump and motor valves operate at only one-twentieth of the surface speed of rotary valves.

While being housed in a small compact case so that it can readily be built into machine tools, the unit is also suitable for a wide range of industrial applications because either mechanical, hydraulic, or electrical controls can be provided.

Barber-Colman Type V Vertical Automatic Hobbing Machine

Designed for high production, high quality, and accuracy on long runs, the Barber-Colman Type V Vertical Automatic Hobbing Machine shown here, product of Barber-Colman Company, Rockford, Ill., has many outstanding features. The vertical design makes possible conservation of floor space, complete accessibility from front and rear, and unusual strength and rigidity. Other advantages are inherent due to gravity, such as the fact that chips and coolant fall directly into the chute provided for them.

Quick change-over is an important feature. Speed, feed, and index gears can be selected quickly and mounted easily. Positive depth of cut and movement of work-slide are established by



SOMEBODY'S GOING TO GET A DARN GOOD DRESSING DOWN

To get real performance from your grinding wheels, they need a good dressing regularly.

The best way to be sure the job is done right, is to use New Improved Vincent-Huntington dressers with bushings that can't turn and wear out the bearing holes in the handle.



These new type Huntington dressers, equipped with Milled tool steel cutters, heat treated by the "Vincent Process" to the proper degree of hardness and toughness, is your assurance that the dressing will be well done.

Call your nearest Mill Supplies distributor. Insist on the dressers with the aluminum finish.



Write for descriptive catalog sheets
Vincent Steel Process Co.

2434 BELLEVUE AVENUE

"IF IT'S A HUNTINGTON DRESSER OR CUTTER VINCENT MAKES IT"

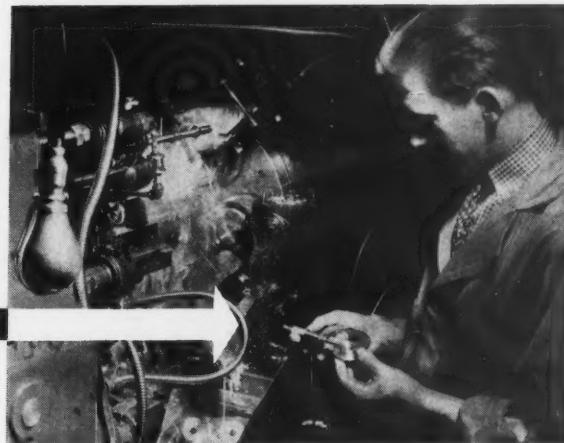
PRECISION HERE...

*comes
from*

PRECISION HERE...

*for
GREATER PRECISION...
HIGHER PRODUCTION*

CARBORUNDUM



ACME-GRIDLEY AUTOMATIC BAR MACHINES ARE FAMOUS for precision, speed and long life. These qualities are the result of expert design and unusually accurate, careful methods of manufacture. Carborundum is proud of the important part it plays in the production of this outstanding machine.



TYPICAL OF MANY PRECISION GRINDING OPERATIONS which assure accuracy of the $2\frac{1}{4}$ " Eight Spindle Acme-Gridley Automatic. Two bearing surfaces of the integral spindle carrier and stem are ground on same centers, at one setting with the same Aloxite Brand Aluminum Oxide Wheel. Tolerance in diameter allowed for 36" stem: $\pm 0.0005"$. Tolerance in periphery spindle carrier bearings: $\pm 0.0005"$. Alignment tolerance of stem with carrier from center axis for entire length of unit: $\pm 0.0002"$!! Here again we note the advantage of having the right wheel in the right place.

THE CARBORUNDUM COMPANY, NIAGARA FALLS, N. Y.

Sales Offices and Warehouses in New York, Chicago, Philadelphia, Detroit, Cleveland, Boston, Pittsburgh, Cincinnati, Grand Rapids
(Carborundum and Aloxite are registered trade-marks of The Carborundum Company)



Barber-Colman Type V Vertical Automatic Hobbing Machine

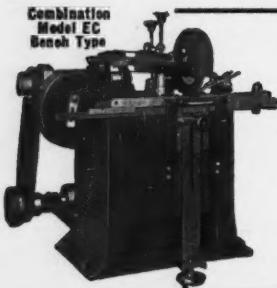
to the hydraulic unit, coolant pump, and work-slide rapid traverse. The cycle includes rapid traverse with conventional or climb cutting as determined by the setting of the controls.

The large box section columns are securely mounted on a heavy base and doubly reinforced by a rugged crown member at the top. The base contains the coolant hydraulically against a positive stop during hobbing. The hob spindle slide is dovetailed in a heavy, large diameter swivel base which has worm and wheel vernier angular adjustment and is provided with a powerful clamp. The hob spindle, which is extra heavy, is hardened, ground, and mounted in precision bronze bearings independently adjustable and rigidly supported. The end support makes it easy to mount or change hobs. Enclosure of hobs confines coolant to the area of greatest heat production. Micrometer adjustment for positive stop ensures precise depth of cut and exact duplication.

Spindle speeds are changed easily by means of pick-off gears in an oil-tight compartment. Movement of the starting lever starts an operating cycle which stops automatically when completed. Movement of another lever makes it possible to rotate the hob and work independently of other movements. The automatic cycle can be stopped instantly by movement of another lever.

simple adjustments. Central controls give the operator complete command of individual movements in cycle.

The automatic operating cycle employs, in most effective combination, hydraulic pressure for actuating the hob carriage, clutches, and clamping mechanism, mechanical drives to the hob spindle and screw feed, electrical drives



SHARPEN YOUR OWN SAWS

**SAVE OVER 80% ON SHARPENING
HACK, BAND, CIRCULAR SAWS**

The WARDWELL SAV-A-SAW automatically sharpens saws with teeth as fine as 32 to the inch at a speed up to 75 per minute. Savings on 2 gross of blades will pay for the machine. Assures keener cutting saws at extremely low cost.

Write for complete information

THE WARDWELL MFG. CO.

3166 FULTON RD.

CLEVELAND, OHIO



THIS JOB DEMANDED

- close centering
- maintained accuracy
- vibrationless high speed cutting

AND CUSHMAN PRECISION CHUCKING IS FILLING THE BILL

The photograph above was taken in Detroit at one of the large production plants making non-ferrous metal parts. The chuck requirements for the job demanded close precision of centering, dynamic balance to eliminate vibration at high cutting speeds and maintained accuracy for long, continuous service.

The chuck used was a Cushman precision 2-jaw chuck, Type 422. The body of the chuck is furnished with a hardened steel top plate which provides improved support for the jaws and assures accurate alignment throughout a long service life. In addition, it gives precision alignment of the master jaws on maximum bearing surfaces to insure a greater precision in the alignment of work pieces than has been heretofore available with chucks of this type.

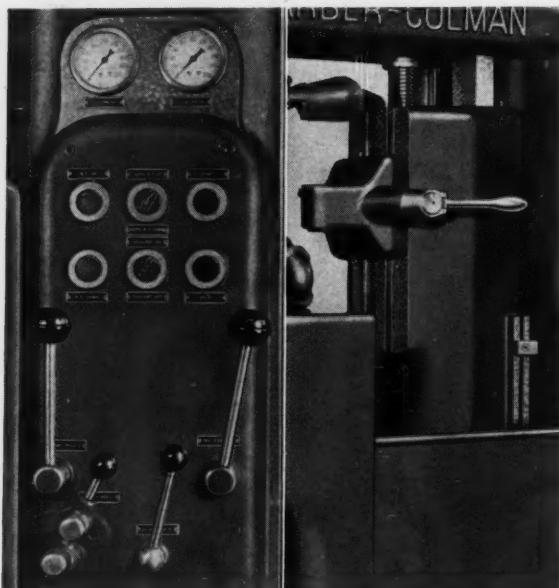
Cushman Engineers are glad to consult with you whenever special chucking equipment will best serve your needs.

THE CUSHMAN CHUCK COMPANY, HARTFORD, CONNECTICUT

A world standard for **PRECISION**

CHUCKING
ENGINEERS
Since 1862

which also causes the hob to clear the work and the work-slide to rapid-return except when traverse control is in neutral. Feed can be stopped and started again during the automatic cycle.

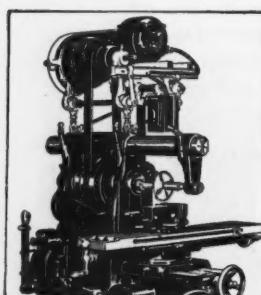


(Left) Close-up view of control group. (Right) Close-up showing work-slide and single lever control for outboard arbor support.

cle. The work-slide rapid traverses up when an upper button is pressed and down when a lower button is pressed, stopping instantly when either button is released.

The main drive motor is adjustably mounted in a well-ventilated compartment opening at the rear. The heavy work-slide has a long bearing with hardened and ground gibs. Vertical movement of the work slide puts the lead screw in tension, eliminating backlash. The work spindle, which is mounted in precision preloaded anti-friction bearings, has a large diameter flange for mounting work-holding devices and is threaded at the lower end to provide for work-clamping. Movement of a single lever unclamps the arbor support, moves it, and re-clamps all in one motion.

The capacity of the machine is: diameter, maximum, 8 in.; face, maximum, 9 in.; diametral pitch, steel, 4. Maximum travel of work-slide, 10 in. Maximum distance centerline of work spindle to centerline of hob spindle, 6½ in. Hob diameter, maximum, 4 in. Hob length, maximum, 4 in. Hob spindle speeds, 73, 90, 102, 124, 150, 180, 220, 250, and 307 r.p.m. Maximum feed per revolution of work, 0.200 in.; minimum, 0.015 in. Motor recommended, 5 h.p., 1,800 r.p.m. Floor space, 38 x 57 in. Weight, net, 8,950 pounds.

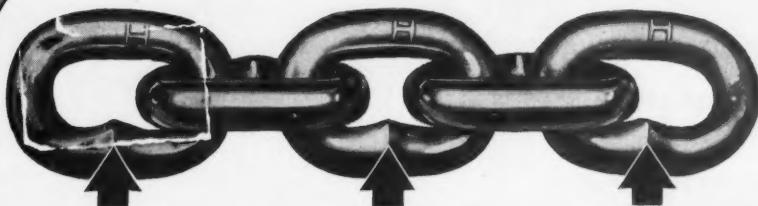


Sensational Accuracy

If you want the economy of faster production with fewer rejects get the facts on Remco Motor Drives. Rigid! It has three suspension points, instead of one, or two. Applied with 5 bolts. Write! Remco Products Corp., State and Hay Sts., York, Pa.

REMCO MOTOR DRIVES
for LATHES, SHAPERS, DRILLS, MILLING MACHINES, etc.

**25% more "GUTS"
in loading chain**



WHEN YOU SEE THESE "SWELLS" AT THE WELD

● That's where a link needs strength the most—at the weld. Hercules Steel Loading Chain has plenty of extra strength at this vital point—extra metal, inside and out of the way, put there by the patented "Inswell" welding process. The chain itself is fabricated of special analysis, heat treated steel—and carefully tested to *twice* its safe working load. Look for the identifying "H" on the link—it's your guarantee of 25% more strength, safety and wear. Your dealer has all the details—or write us direct.

COLUMBUS-MCKINNON CHAIN CORPORATION

(Affiliated with Chisholm-Moore Hoist Corporation)

140 FREMONT AVE.

TONAWANDA, N. Y.

Branch Offices: NEW YORK • CHICAGO • CLEVELAND

**HERCULES
Steel LOADING CHAIN**

They said it was

Impossible

To CHROME PLATE and
FINISH Gage Blocks to
Standard Accuracies . .

The DEARBORN GAGE COMPANY has not only proved that it can be done — but that the price is very little more than the ordinary steel gage block — and that the ultimate saving will equal many times the original cost.

HAVE YOUR OLD SET RECONDITIONED to its Original Accuracy and find how much better it will be than ever before.



DEARBORN GAGE COMPANY

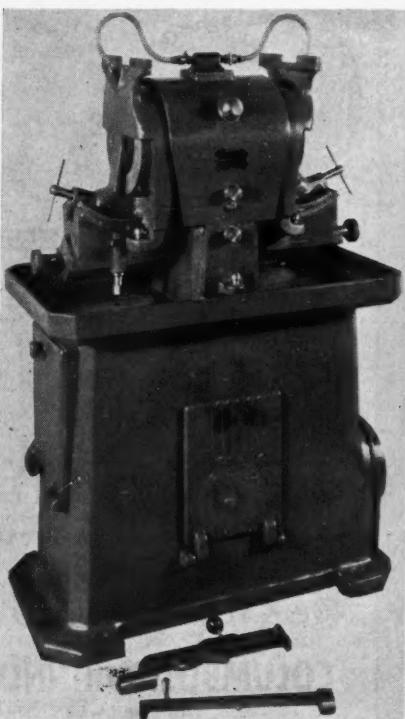
"Originators of Chromium Plated Gage Blocks"

22035 Beech Street
DEARBORN - MICHIGAN

Oliver Template Tool Bit Grinder

The Oliver Tool Bit Grinder shown here has been developed by Oliver Instrument Company, 1430 E. Maumee St., Adrian, Mich., to automatically produce any desired shape on a regulation tool bit up to $\frac{3}{4}$ in. square.

The principle of the machine includes



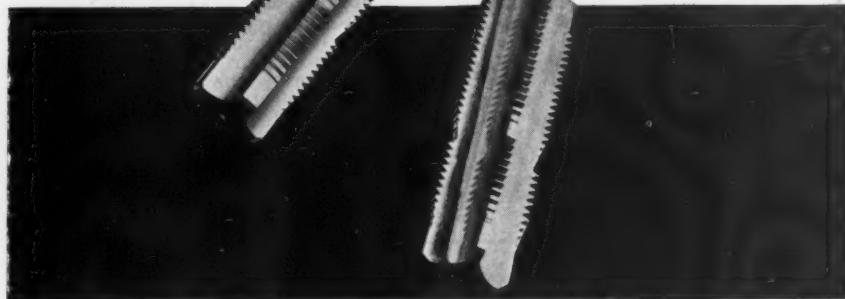
Oliver Template Tool Bit Grinder

a holder for the tool to be ground. The holder rests on a ball and socket joint at its lower end and has at its upper end a template giving the exact shape of the tool form, twice size. This tool holder is placed on a ball which forms a part of the wheel guard and the template is held so that it may contact a straight edge, also a part of the wheel guard. The tool is rocked against the wheel until the template comes in contact with the straight edge, when no

wn
In-
St.,
ice
ool
les

KEEN TEETH

Cut Costs



To get the most out of a tap, keep it *sharp*.
The hard refined cutting edges of BATH
TAPS will take regrind after regrind.

Why?

Because—BATH TAPS are ground from the solid *after* hardening . . . to insure a correct and uniform metal structure from core to cutting edge. This permits repeated resharpenings without loss of efficiency.

JOHN BATH & CO. • WORCESTER, MASS.

more metal can be ground from the tool.

The machine is equipped with a roughing and a polishing wheel, and when the metal is removed by means of the roughing wheel, it is transferred to the finishing wheel where it is given a very fine finish. Wheels suitable for any type of tool bit—Carboloy, high speed steel, and so on—may be obtained.

In this machine, the trouble and expense of providing a template have been obviated by a special holder in which a tool of the exact shape desired, may be inserted and a blank template attached in its proper place. The tool is then rocked against a steel form and the template is ground to exact shape on the wheel. The template is then placed in the regular tool holder and will reproduce the tool shape which made it. Setting gages are provided on the machine which regulate the amount of metal to be removed from the tool. These stops have micrometer adjustments and the exact amount of metal desired may be removed.

Any desired degree of clearance may be obtained by tipping the wheel guard in proper relation to the wheel. Adjust-

ment is provided for this and the clearance indicated on a graduated scale. The exact relation of the wheel to the straight edge and ball socket is maintained by means of a diamond holder which fits on the wheel guard in the same way that the tool holder is held and as the diamond is traversed across the wheel, it is brought into exact alignment. This need be done only when the wheel needs straightening.

The spindle is mounted on Timken roller bearings and is driven by a 1 h.p. motor in the base. The pump which provides water to the wheels is also enclosed in the base and is driven by the same motor.

Hanna High Speed Pneumatic Riveter

The riveter shown in the accompanying photograph is the latest addition to the line of riveters made by Hanna Engineering Works, 1757 Elston Ave., Chicago, Ill. Speed of operation is a feature—a complete riveting stroke (forward and return) being made in less than one second.

**PROCUNIER HIGH SPEED
TAPPING HEADS**
for PRECISION
TAPPING

To take advantage of the many improvements in taps, cutting lubricants, fixtures, etc., which have been developed in the last few years, your tapping equipment must be right up to the minute.

PROCUNIER Engineers are in close touch with modern methods and requirements, and can give you the finest, most up-to-date tapping equipment available.

Send today for latest literature.

PROCUNIER SAFETY CHUCK CO.
12 SOUTH CLINTON STREET CHICAGO, ILLINOIS



SAVE SET-UP TIME

Simplicity-Efficiency-Speed

Simplicity of adjustment is one feature of ALCO Drill Chucks and ALCO Tap Holders. One wrench and a simple twist does the trick. To make a change in the size of a drill or tap is a simple one-wrench operation.

Through a simple operation, and there are no bushings to bother with, the adjustment is positive; absolute concentricity is assured; and think of the time saved, since you don't have to look for the special size bushing required to make the change.

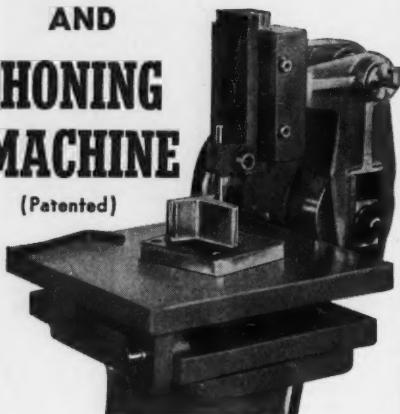
Speed in changing from one size drill or tap to another is the result. And don't overlook the more accurate work these tools do. You simply cannot afford to neglect a thorough investigation. Write today for full particulars to Alco Tool Co., Bridgeport, Conn., U. S. A.

ALCO TOOLS
EFFICIENT



FILING AND HONING MACHINE

(Patented)



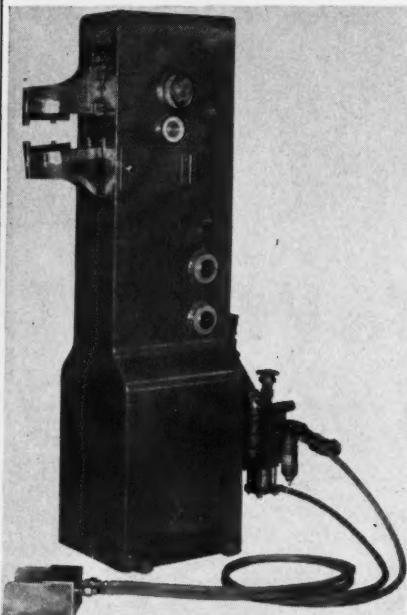
Sturdy, Fast, Accurate

Machine finish your punches.
Eliminate the slow, tedious hand
method.

Guaranteed to cut your cost.
Price and description on re-
quest.

BRICKNER-KROPF
MACHINE COMPANY, Inc.
MUSKEGON • MICHIGAN

When operated at 80 lbs. air pressure, this riveter exerts 20 tons on the dies which will drive up to $\frac{1}{8}$ -in. diameter rivets cold and $\frac{1}{2}$ -in. rivets hot. Die stroke may be anything to a maximum of 3 in. The riveter will exert its rated pressure (20 tons) uniformly upon the work even though the variation in



Hanna High Speed Pneumatic Riveter

length of rivet and thickness of grip vary as much as $\frac{1}{8}$ inch.

The driving jaws are of the "Alligator" or "Nut Cracker" type, shaped to avoid interference with the assemblies being riveted. They are of simple design and inexpensive, made of standard heat treated alloy steel bar stock. Coupled with the fact that they may be removed very quickly, any number of stakes may be kept on hand to accommodate the varying requirements of the users.

The power of the air cylinder is multiplied and transmitted to the driving jaws through a hardened and ground alloy steel wedge and anti-friction roller bearings. Consequently, it is most economical in air consumption. The me-



OUTSTANDING FOR
CRAFTSmanship!

Highest Precision Guaranteed

CARBOLOY-TIPPED TOOLS and GAGES
DIAMOND TOOLS and WEAR PARTS

If your problem is difficult, write:

ARTHUR A.
CRAFTS COMPANY, Inc.
532 Commonwealth Avenue, BOSTON
CHICAGO DETROIT NEWARK

BALL THRUST STEP BEARING
Special Bearings Made To Order—Any quantity "one bearing or one thousand." Your present bearings duplicated. Send sketch or worn sample, regardless of condition, for quotation.
Catalog Upon Request

THE GWILLIAM CO.
358 Furman St. Brooklyn, N. Y.

**FREE MANUAL DESCRIBES NEW WAYS
TO REDUCE METAL-WORKING COSTS**

You will find this new 36-page manual a regular gold mine of valuable up-to-date information on the many uses of CERROMATRIX, the remarkable low-temperature-melting alloy that expands slightly on solidifying. Eighty-one photographs and drawings and many pages of instructional data gathered in the leading metal-working plants of this country and abroad will make this manual a priceless addition to your shop library.

Send coupon for your manual today—no charge or obligation.

**CERRO DE PASCO
COPPER CORPORATION**

44 WALL STREET, NEW YORK, N.Y.

BRITISH ASSOCIATES : Mining & Chemical Products Ltd., London, England

CANADIAN REPRESENTATIVES : Dominion Merchants Ltd., Montreal, Canada



Cerro de Pasco Copper Corporation
Dept. A, Room 1502
44 Wall Street, New York, N.Y.

Gentlemen: Please send me your new free 36-page Cerromatrix Manual.

NAME _____ TITLE _____

COMPANY _____

STREET _____

CITY _____ STATE _____

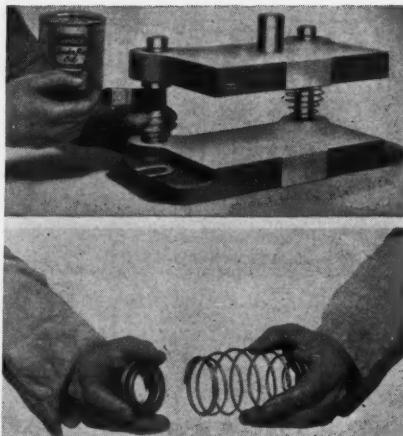
chanism is entirely enclosed.

Operation is by a foot-actuated valve which may be moved about the floor for most convenient operation. The riveter is equipped with air filter, lubricator for air supply, and the mechanism is Alemite lubricated.

Baumbach Universal Oiler for Die Set Leader Pins

E. A. Baumbach Manufacturing Co., 1812 S. Kilbourn Ave., Chicago, Ill., announces the perfection of an automatic oiling system which is applicable to any make of die set. The oiler consists of two simple units—a compression spring and an oil-retaining ring. The oil-retaining ring is made of steel and embodies a high-grade absorbent wick which fits around the leader pin and rides up and down by means of the movement of the punch press. The low tension spring, acting as a booster, lifts the ring to sufficient height on the up stroke to assure spreading a film of oil on practically the entire length of the leader pin.

This oiling system is said to reduce



Baumbach Universal Oiler for Die Set Leader Pins

undue wear on bushings, avoid trouble due to faulty lubrication, and loss of valuable press and operating time. Continuous lubrication is obtained by mere-

Want a book showing
OVER 5000 DIFFERENT FILES?
by GROBET
The "original" Swiss File Maker



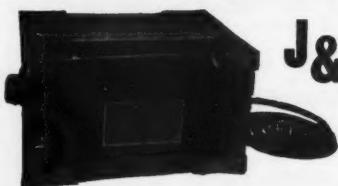
Here's the most complete catalog of its kind illustrating and describing over 5000 different shapes, sizes and cuts of precision files. Also Files for Filing Machines, Rotary Files, American Style Files, etc.

Learn more about these Chrome Steel Files that have won a reputation for utmost precision and durability.

WRITE FOR CATALOG KNA.



GROBET FILE CORP. 3 PARK PLACE •
OF AMERICA NEW YORK CITY



J & H

The Demagnetizer

For Alternating Current

The J & H Demagnetizer requires no countershaft, belts, or other intricate electrical connections. All that is necessary is to plug it into the nearest lamp socket or receptacle.

It is of the new Unipole type—heavy duty—and can be supplied for either 110 or 220 volt alternating current. Size 12" long, 9" deep, 6" high. Weight 60 lbs.

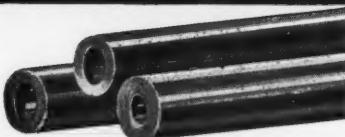
Sold On One Week's Trial

J. & H. ELECTRIC CO.

202 Richmond Street, Providence, R. I.



**SAVE MONEY
on BISCO
TOOL STEEL TUBING**



You Save the cost of drilling rings, bushings, etc., when you order BISCO Tool Steel Tubing. The holes are FREE. Sizes up to 14" diameter.

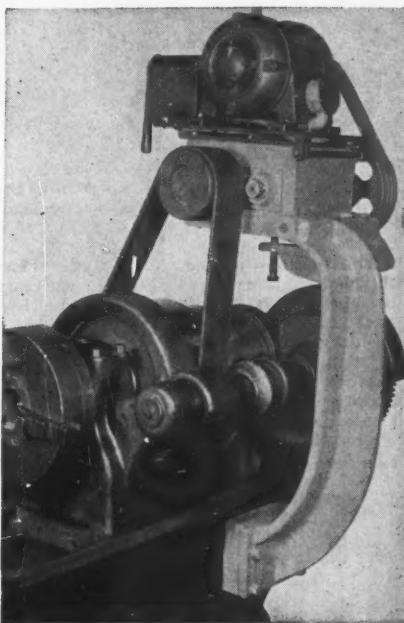
Also: Stainless Tubes, Aircraft Tubes, Mechanical Tubes, Pressure Tubes, Cold Finished Steels, Tool Steels, Special Steels, etc.

The Bissett Steel Co.

Mr. C. O. Watkins
11955 Princeton Ave.
Chicago, Ill.

Mr. Victor Brook
433 Rockingham St.
Rochester, N. Y.

MOTORIZATION DRIVES



5 HP 4 Speed Gear Box

No one drive meets all requirements advantageously.

Be sure to choose the correct type for your application.

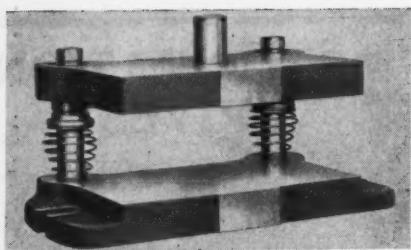
We offer:

V Belt Drives
Gear Motor Drives
4 Speed, Gear Box Drives.

Send us a list of your requirements and get unbiased recommendations.

PRODUCTION EQUIPMENT CO.

5219 CHESTER AVE. CLEVELAND, OHIO



Die Set Equipped with Baumbach
Universal Oiler

ly stopping the press, compressing the spring by hand, and swabbing the leader pin with a brush full of oil, which the wick absorbs.

The oilers are said to pay for themselves in a short time through savings in bushing replacements and the fact that they can be used over and over on other jobs. Safety to the operator is also promoted because the spring acts as a guard, deflecting the punch press operator's hand from catching between the pin and the bushing.

The oilers are available in sizes to

fit leader pins from $\frac{3}{4}$ to 3 in. in diameter, with spring lengths of $2\frac{1}{2}$, 4, 6, and 8 inches.

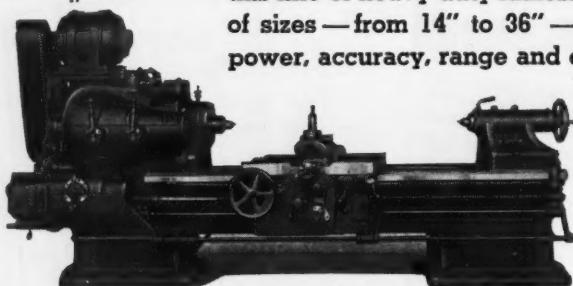
Sterling Welder Remote Control

Something new in the field of arc welding equipment is the recently announced Sterling G-R Remote Control system, product of Sterling Products Co., 3380 Robertson Blvd., Los Angeles, Cal. According to engineers of the Sterling Products Company, manufacturers, the remote control system permits current regulation by the operator without breaking the arc and gives the welder constant control of welding heat regardless of the distance between the welding set and welding operations.

A compact switch mounted on the welding tongs controls a low-voltage relay circuit carried by an auxiliary cable attached to the welding lead. The relays, mounted in a ventilated enclosure on top of the welding set, control a reversible motor which drives the welding machine's current regulating mechanism through a standard gear reduction unit. A control switch has also been provided at the welding set.

Boye & Emmes Lathes

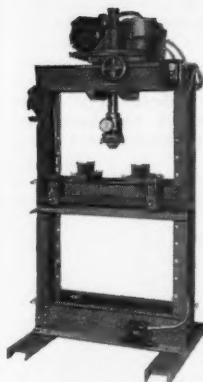
Forty years of specialized manufacture are behind this line of heavy duty lathes. Made in a full range of sizes — from 14" to 36" — each of outstanding power, accuracy, range and economy.



MODEL "E"—24 INCH

Write for
complete detailed
specifications.

THE BOYE & EMMES MACHINE TOOL CO.
CINCINNATI • **OHIO**



LEMPCO
All Purpose
Presses

•
**Up to 60 tons
Pressure**
•

**Built to
"take it"**

Install a Lempco Press in your shop today for pressing on arbors, setting dies or any one of the many jobs that call for a power or hydraulic press. There are different models, all of heavy I-beam and channel construction, priced to fit any shop. Write for catalogs giving all the details.

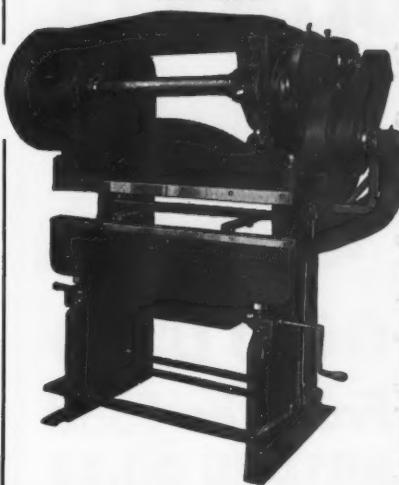
LEMPCO PRODUCTS, INC.

Dept. HP

BEDFORD, OHIO

CHICAGO
STEEL PRESS

No. 253



**does 40% to 60% of the
forming work turned out
by the average shop.**

Here's a profitable, economical brake ideally adapted for rapidly forming metal sections such as in stoves, refrigerators, soda fountains, steel cabinets, metal furniture, steel boxes, and a great variety of sheet metal specialties. Its variable speed drive operates from 17 to 50 strokes per minute. The No. 253 CHICAGO STEEL PRESS is accurate, compact, and ruggedly constructed of highest quality materials.

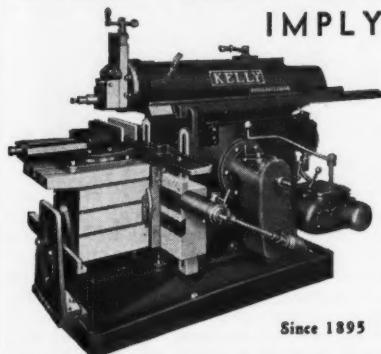
Sizes 4, 5 and 6 ft. capacities up to 10 gauge.

Write for Circular No. 253

**DREIS & KRUMP MFG.
Company
7418 LOOMIS BLVD.
CHICAGO
ILLINOIS**

KELLY SHAPERS

IMPLY



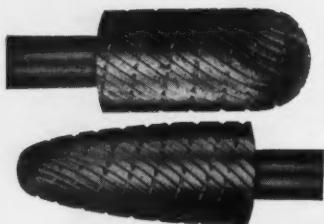
Since 1895

FLEXIBLE OPERATION

•
BUILT BY

**General Engineering & Mfg. Co.
ST. LOUIS
MISSOURI**

JARVIS



GROUND *From the Solid* ROTARY FILES

Jarvis Rotary Files are ground from the solid with the head and shank in one piece. The various shaped blanks are machined, hardened and finally the teeth are ground into the solid, hardened blanks.

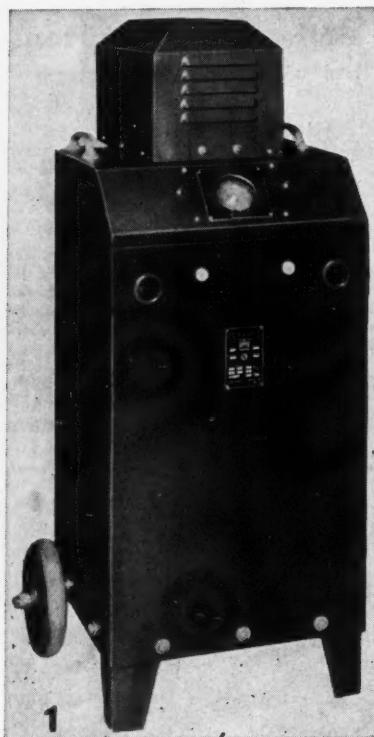
Grinding from the solid after hardening makes for harder and sharper teeth —(the teeth are not dulled by heat treating).

Jarvis Rotary Files may be reground many times at a fraction of their original cost, (thus bringing the price of the file below the cheapest hand cut file.)

Ask for new catalog MST etc.

Chas. L. Jarvis Co.
MIDDLETON • CONN.

Reports on present remote control installations indicate valuable savings in welding time as well as improved quality of the welding. Operator's efficiency is increased (especially on structural or large-scale fabrication jobs where welding is done at considerable distance from the welding sets) be-



Sterling Welder Remote Control

cause welding current changes may be made without interrupting work. By giving the operator convenient "fingertip" control of current, quality of the work improves through the use of exactly the correct heat for each type of rod and kind of weld.

At present the new remote control system is available only for Sterling G-R transformer-type arc welders which provide full-range, "step-less" current regulation without altering welding characteristics. Seven models are now

in production, ranging from a compact shop unit delivering a maximum of 125 amperes up to a heavy-duty industrial set with a current range of 50 to 1,250 amperes. As the result of several years research, Sterling engineers developed a new principle of welding transformer design said to provide improved welding characteristics and high (84 to 96 per cent) efficiency, in addition to infinite current control. The heavy-duty industrial units are designed for either single or multi-circuit manual welding, or for supplying controlled current to automatic welding heads.

Van Keuren Optical Parallels

A set of optical parallels for checking the flatness and parallelism of faces of micrometers, measuring machines, and instruments by the light wave in-



Van Keuren Optical Parallels

terference method is announced by The Van Keuren Company, 12 Copeland St., Watertown, Boston, Massachusetts.

The set includes two parallels as shown in the accompanying illustration. The parallels are $1\frac{1}{4}$ in. in diameter and are accurately flat and parallel within five millionths of an inch. One parallel is approximately 0.650 in. in thickness and the other is approximately 0.6375 in., or 0.0125 in. less. The 0.650 in. thick parallel checks the parallelism of the anvil and spindle faces with the spindle in the same angular position as at zero. The 0.6375 in. parallel checks the parallelism of the two faces at one-half turn or 0.0125 in. away from the zero position. Thus, while the anvil and spindle may show perfect par-

JARVIS



FLEXIBLE SHAFTS AND MACHINES



Single and multiple speed flexible shaft units from 1,750 to 18,000 R.P.M. in various horse-power ratings.

WRITE FOR OUR NEW
CATALOG MST

Chas. L. Jarvis Co.
MIDDLETOWN • CONN.

allelism at zero, the other parallel will show any lack of squareness of the spindle face when it is moved around one-half turn from the zero position.

The meaning of the interference bands which will be seen when the micrometer faces are brought in contact is easily understood. Contact will be made on the glass parallel at the two nearest points on the anvil and spindle face, and the number of interference bands that occur on each face tell how much that face runs off from the contact points in units of 0.00001 in. (The sum

of the number of bands occurring on each micrometer face gives the total error of parallelism.) If the two faces are perfectly flat and parallel, one broad or continuous band will form across both faces. On new or relapped micrometer faces the interference bands may be easily seen in diffused daylight. A monochromatic light may be required to show the bands on worn faces.

Gits Oil Gage Plug

The illustration shows the Style CW Gits Gear Case Oil Gage Plug—one of a line of oil gage plugs now being made by Gits Bros. Mfg. Co., 1846 S. Kil-



MULTIPLE
UNITS
*from single
drills*

U.
S.

• U. S. Multiple Drill Head Units quickly convert any single spindle drill into a multiple unit. Thus, you are assured more holes per minute and larger profits.

Send blue prints for estimates.

The United States Drill Head Co.
1354 Riverside Drive
CINCINNATI, OHIO

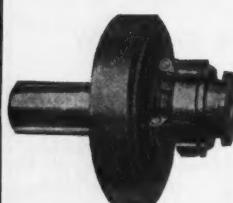


Gits Style CW Oil Gage Plug

bourn Ave., Chicago, Ill. The CW Flanged Oil Gage, for flush mounting, is turned from solid round brass rod. Four unbreakable socket head screws hold the unit firmly in place and guard against leakage. All parts are replaceable. The Style BW Hexagon Oil Gages are turned from solid hexagon brass rods. Shank threads are die cut and accurate, and the glass disc is rolled between two heavy cork gaskets, assuring leak-proof joints.

The Style CW plug is made in body diameters of $1\frac{1}{8}$ to $3\frac{1}{8}$ in. for bolt cir-

"EDGEMONT" SERVICE TESTED FRICTION CLUTCHES DISC "TYPE SF"



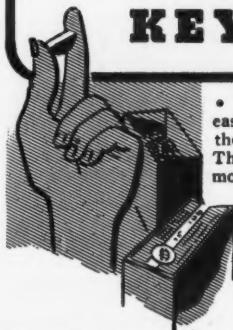
Years of service on the most severe drives proved the Edgemont "Type SF" Disc Clutch to be a truly superior clutch. Correct design, hardened rollers and cam, single—one hand—adjustment for liner wear, and few operating parts all combine to give

"CARE FREE SERVICE AT ANY SPEED"

Send for circular now—it contains a full line of pulleys, extended sleeves, and cut-off couplings.

THE EDGEMONT MACHINE CO.
2100 HOME AVENUE
DAYTON, OHIO

Quicker assembly . . .
Lower cost with
WHITNEY
Woodruff
KEYS



• Whitney keys are easily fitted — because they're accurately made. That means time-saving, money-saving assembly of shaft and keyed member. Yet Whitney keys reach deep in the shaft, stand greater strain, can't roll over. Write for Catalog V-111 and price list.

The Whitney Chain & Mfg. Co.
 HARTFORD • CONNECTICUT

S T H O R S T A M P S

Made of special long-life alloy steel, THOR STAMPS give consistently clear marks for a long time. Central striking point assures uniform indentation. Thumb side - marking makes them easily read —easily used.

Write for catalog.



The Pittsburgh Stamp Co.
 812 CANAL ST. • PITTSBURGH, PA.

HOW TO SELECT AND HEAT TREAT TOOL STEEL To Get Better Tools

If you are responsible for tools—if you want a plain, practical, common sense explanation of how to make tools last longer—if you want a simplified method of selecting and heat treating tool steel—if you want 315 pages of answers to everyday tool room problems—here is the book you want.

Over 12,000 copies in use
TOOL STEEL SIMPLIFIED

By Frank R. Palmer
 Assistant to the President
 The Carpenter Steel Company
 315 pages—6x9—205 illustrations
 \$1.00 postpaid in U. S. A.
 \$3.50 outside U. S. A.

With its help more than 12,000 tool makers are showing their companies how to get bigger production and how to reduce costs. You will gain from it information formerly available only from steel mill experts—information in simple non-metallurgical terms that will help you gain more complete control over the progress of your work. Use this convenient coupon to get your copy of this hand book.

Quick Answers To Questions Like These

- How to stop tools from warping
- How to avoid grinding checks
- How to make tools wear longer
- How to make tools that won't break
- How to prevent size change
- How to make the spark test
- How to be a trouble shooter



\$1 Postpaid
 In U. S. A.

THE CARPENTER STEEL COMPANY
 Dept. D-3, Reading, Penna.

I WANT TO REDUCE TOOL COSTS. Please send me postpaid your convenient 315 page handbook—"TOOL STEEL SIMPLIFIED." I am enclosing \$1.00 (\$3.50 outside U. S. A.) in full payment.

Name.....
 Address.....
 City & State.....
 Firm.....
 Occupation.....

cles of $1\frac{1}{2}$ to $2\frac{1}{2}$ -in. diameter. The Style BW is made for stock threads of $\frac{1}{8}$ to 2-in. pipe, in body sizes of $\frac{1}{2}$ in. hex. to 2% in. hex.

G. E. Surface Indicator

A device so sensitive that it will indicate the differences in thickness of a fingerprint on a piece of smooth glass has been developed by J. A. Sams of the General Electric Works Laboratory, General Electric Company, Schenectady, New York.

Known as a surface indicator, the instrument is used to determine the smoothness of metal or painted surfaces and indicates minute variations far beyond the range of the human eye. Variations of as little as $1/1,000,000$ of an inch are clearly indicated. By its application, the surfaces of bearings or other moving parts of motors or the like that are subject to wear may be tested and their smoothness indicated.

The apparatus appears somewhat like a phonograph with its turntable on which is placed the object to be tested, and its sapphire-pointed stylus or needle that passes over the test material as it revolves. Small mechanical impulses



J. A. Sams of General Electric Works Laboratory Operating Surface Indicator

are created as the hard point rides over the surface irregularities. These impulses are then transmitted to an electromagnetic pick-up which converts them into electrical impulses. They are then amplified and transmitted to a recording meter where the surface characteristics are graphically indicated.

The stylus or needle is so sensitive

CONCO
TORPEDO ELECTRIC HOIST



Note the low price...then examine this new, heavily built, cable and drum type electric hoist, with push button control. Available in 250, 500 and 1000 pound capacities for either hook, lug or trolley suspension. The world's biggest value in hoists.

CHECK THESE SPECIFICATIONS

Double drum construction—electric brake—dust and oil tight housing—limit switch—dependable lubrication—one year guarantee.
Beginning at:

WRITE FOR DESCRIPTIVE BULLETIN

\$119.50

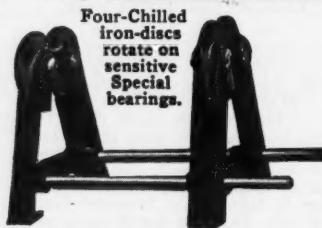
"For over 20 years builders of band-power and electric cranes, hoists and trolleys."

CONCO ENGINEERING WORKS
DIVISION OF H. D. CONKEY & COMPANY
DEPT. Z MENDOTA, ILLINOIS

Improved Anderson Balancing Ways
No Leveling Required

A simple and excellent device for balancing, straightening and truing.

Swing	Greatest Distance Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000



Write for Full Information
Made by **Anderson Bros. Mfg. Co.**
1926 Kishwaukee St., Rockford, Ill.



**Free Cutting!
Non-Glazing!
Abuse Proof!**

New WTTCo **Diamond Impregnated WHEEL DRESSER**

Whole, unbroken diamonds of high quality and extreme toughness are spaced regularly throughout the matrix to give great accuracy, uniform dressings and to hold wheel to size. These stones are anchored permanently in their matrix by strong chemical bonds that will not break under heat, pressure or rough abuse. No remounting! Lowered costs!

Send for literature and prices.

WHEEL TRUEING TOOL CO., INC.
3200 W. Davison • Detroit

In Canada: 575 Langlois, Windsor, Ont.

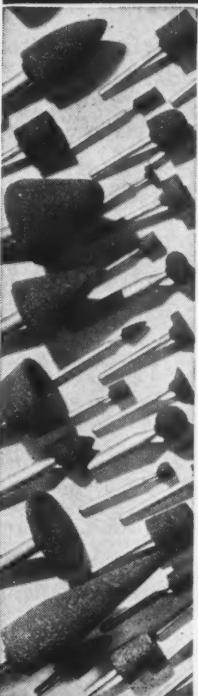
Gammons REAMERS AND END MILLS

ORIGINATORS of the
Helical Taper Pin Reamer
Special Reaming Problems Invited
Immediate Shipment on Stock
Tools

SEND FOR CATALOG
Dept. G

SPIRAL SPECIALISTS
THE GAMMONS-HOLMAN CO.
MANCHESTER, YORK

CHICAGO MOUNTED WHEELS



The first small abrasive wheels mounted on steel mandrels to be offered to industry.

The first with a special new and exclusive bond—stronger than ordinary bond—grinds more pieces per wheel—gives much longer service—eliminates tedious, costly hand work.

Chicago Mounted Wheels are tough, with a bond that can "take it." Made to meet modern working conditions of all type operations.

A full range of grades, grains and abrasives in all shapes insures the right Mounted Wheel for the job. Prompt shipment from stock at all times.

Catalog of complete line free.

HANDEE TOOL OF 1001 USES

Smooth, controlled power at your finger-tips to do a multitude of jobs in model and tool room, on the production line, to repair some hard-to-get-at part on machinery, without removing the part. 25,000 r.p.m. Wt. 12 oz. Plugs in any electric socket. \$18.50 postpaid with 6 Accessories.

NEW — 84-PAGE CATALOG.

Information on all Handee Products, including largest assortment of accessories ever presented.



10 Days
Free Trial

CHICAGO WHEEL & MFG. CO.
1101 W. Monroe St., Dept. MM, Chicago, Ill.

that when it is placed on the revolving metal turntable, the invisible vibrations established by a person whistling are shown on the recording meter.

capable of doing big jobs and small ones equally well. It has been designed and improved so that all tools within

Knock-Out Reamer and Cutter Grinder

K. O. Lee and Son Company, Aberdeen, S. D., has placed on the market the Knock-Out Universal Grinder which, although of the bench type, is a complete tool sharpening machine.

MAKE THIS TEST

Select the sizes of

WALTON TAP EXTRACTORS

needed in your shop. Use them for 30 days. If not satisfied, return them to us without any further obligation.

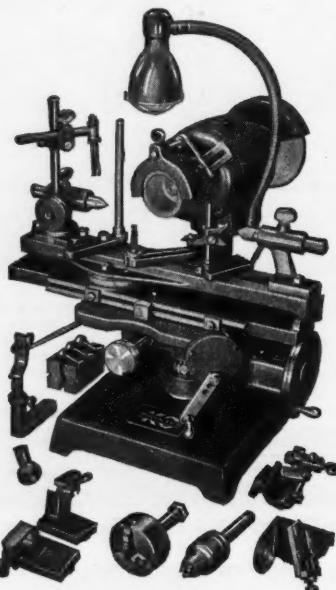
(This offer is limited to firms in the United States)

Write for Folder 132.

Each Tool Must Sell Itself

THE WALTON CO.

98 Allyn St., Hartford, Conn.



Knock-Out Reamer and Cutter Grinder

its range can be set up and ground in the minimum time.

The Knock-Out Grinder will sharpen all types of reamers, milling cutters, taps (with or without centers) from $\frac{1}{8}$ -in. diameter up, and metal slitting saws up to 24 in. It will handle spiral mills, spiral end mills, slotting cutters, keyway cutters, helical cutters, angu-

Here's a Real Spring Winder!

- No. 1 Capacity 0 thru $3/32$ " wire, \$1.25
No. 2 Capacity 0 thru $3/16$ " wire, 2.50
No. 3 Capacity 0 thru $5/16$ " wire, .50



Will Earn Its Cost In One Day
The HJORTH Perfection Spring Winder offers the ideal means of winding extension, compression, torsion, taper, double taper, or left hand springs. Try one in your shop. You'll like it and the price is reasonable.

HJORTH LATHE & TOOL CO. 12 BEACON STREET
WOBURN • MASS.

CYLINDRICAL SUB-PRESSES

Are especially desirable for producing clean cut, accurate parts with compound dies. For after operations, swaging, piercing, trimming, etc., the overhang type is preferred. We have had a long experience in making such dies. Please send us samples or drawings for estimate.



ARCH TYPE

Waltham Machine Works

Waltham

Massachusetts

BALCRANK

Precision
MACHINE
HANDLES

- ① MACHINED FROM SOLID BAR STEEL.
- ② SUPER SMOOTH POLISHED FINISH.
- ③ CLOSE TOLERANCE—ACCURATE BALANCE.
- ④ PRICED BELOW YOUR PRESENT COST.
- ⑤ COMPLETE STOCK ALWAYS AVAILABLE.
- ⑥ WRITE FOR CATALOG AND PRICES.

THE CINCINNATI BALL CRANK CO.
CINCINNATI, OHIO U.S.A.

Small Tools...

Long Length Drills
Special Size Taps
Carried in Stock

High speed and carbon drills, taps,
reamers, milling cutters, hollow mills,
end mills, drill rod, die sets, etc. . . .

Send for New 1939 Catalog

VICTOR MACHINERY EXCHANGE

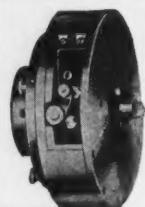
(INCORPORATED)

251 CENTER ST.

NEW YORK CITY

lar cutters, die sinking tools, and so on. With special fixtures it will grind thread chasers, Genesee Hollow Mill Cutters, and Carboly tool bits. The outstanding feature of the grinder is that various set-ups can be made in a very short time.

Specifications for the grinder are: distance between centers, 16 in.; swing over table, 5 in.; swing over table with 1-in. raising blocks, 7 in.; longitudinal feed, 11 in.; cross feed, 3½ in.; vertical feed, 6½ in. The base is provided with a leveling screw.



M-D Facing Heads

With Automatic Feed

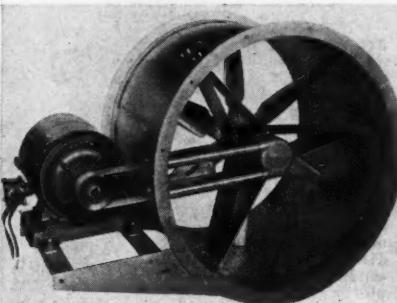
Can be attached to Column Boring Bar, and Drilling or Milling Machine spindles. Single point tool travels radially, from center outward or reverse, feeds automatically and covers faces 6" to 30".

Write for circular.

MUMMERT-DIXON CO.
120 PHILADELPHIA ST., HANOVER, PA.

South Bend Fan Unit

South Bend Air Products, Inc., South Bend, Ind., announces an entirely new fan unit, primarily designed for use in duct systems and claiming a number



Sound Bend Fan Unit for Duct Line Use

of advantages, especially where explosive gases are to be handled.

The unit is available in both single fan and tandem fan types, and for static pressures up to 3 in. Single fan unit capacities range from 1,600 to 26,000 c.f.m., with tandem units from 1,600 to 30,000 c.f.m. These units are easily installed in any duct line without fitting other than for a simple flange on the end of the duct.

Blades are drop forged aluminum alloy, non-sparking, and safe in explosive atmospheres. Motor support is integral with the fan unit. The belt and all working parts are completely enclosed for protection, yet easily accessible. Adjustable belt tension is provided. When used to handle acids, the unit can be furnished completely covered with Heresite. A completely self-

GRINDING WHEEL DRESSERS

We make
all types
of
Dressers
and
Cutters



Write
for
Catalog
"M"

DESMOND-STEPHAN MFG. CO.
URBANA, OHIO

The Canadian Desmond-Stephan Mfg. Co., Ltd.
Hamilton, Ontario, Canada

YOU'LL EARN MORE if You Own
this valuable new ARC WELDING MANUAL
and OPERATORS TRAINING COURSE.



340 PAGES—23 CHAPTERS—6 PARTS—320 ILLUSTRATIONS
FROM PHOTOGRAPHS, DRAWINGS, ETC., CLEARLY SHOW-
ING APPLICATIONS, METHODS AND USE OF ARC WELDING
Every Engineer, Welding Operator, Student, Executive, Supervisor,
Designer, or other individual interested in Welding or any branch of
Electrical, Mechanical or Metal Working Industries, will find this new
book worth many times its small cost. Written in plain, understandable,
non-technical English, and sent on 5 day approval. Order your copy now.
MODERN MACHINE SHOP, Box H, 431 Main St., Cincinnati, Ohio

outh
new
e in
ber

Why Use A Shaper to cut Keyways when a

DAVIS KEYSEATER

will do the
job so much
quicker
and
better?

Send
for
Circular



DAVIS KEYSEATER CO.

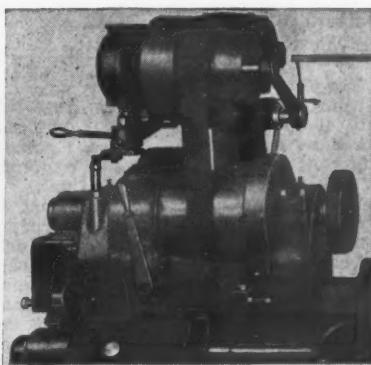
Exchange and Glasgow Sts.
ROCHESTER, N. Y.

HASSALL
Products
CLAY & OAKLAND STS.
BROOKLYN, N.Y.

MADE TO ORDER IN ANY METAL

JOHN HASSALL, INC.

Write for Illustrated Catalog



Modernize Your Machines With Cullman Drives

Your Lathes, Shapers, Milling Machines and other belt driven machines can now be easily motorized with direct drives.

Cullman Drives are rigidly constructed, easily installed and simple to operate.

Made for motors from $\frac{1}{4}$ to 15 H.P.

SEND FOR INFORMATION

CULLMAN WHEEL CO.
1336 Altgeld St., Chicago, Ill.

contained unit is available in practically any size.

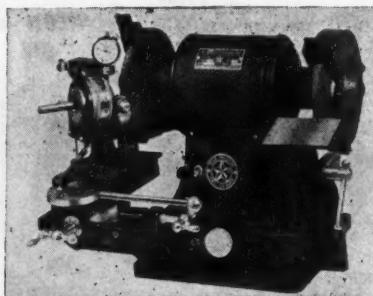
Star Precision Drill Grinder

The drill grinder shown in the illustration, capable of grinding drills from No. 41 to $\frac{1}{8}$ in. inclusive, is manufactured by the Star Machine & Engineering Corp., Bloomfield, N. J., a division of the Star Electric Motor Co.

The manufacturer claims that the grinder easily and speedily produces perfect points on standard twist drills without the use of attachments, being equipped with a precision-made chuck which is adjustable for the entire range mentioned. Lip angles 29 to 89 deg. are obtained by setting the compound rest at the desired reading. Each lip is set for the grind by indicator reading, making it possible to obtain variable clearances behind cutting edges. A zero setting gives a 12 deg. clearance behind edge.

Operation is very simple, only a few motions being necessary to grind a drill. The drill is inserted in the chuck, the first lip set to indicator reading and the cam handle pulled from left to

right, at the same time adjusting the feed screws which center the drill on the grinding wheel. The action in pull-



Star Precision Drill Grinder

ing the cam handle moves the drill point to the wheel and causes the chuck to tilt, creating the cutting edge on the lip of the drill and the clearance behind it. Returning the handle to neutral, the chuck is rotated to the right until the finger of the indicator engages the second flute of the drill. The same

NEAT STAMPING in NAME PLATES



This machine quickly stamps details and serial numbers into name plates.

Write for Particulars

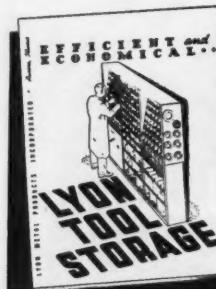
GEO. T. SCHMIDT, Inc.
1806 Belle Plaine Ave. Chicago, Ill.

'CHAMP' ANGLE EDGER

$\frac{1}{4}$ ". Right Angles, 20-ga. 3-to-1 gears make operating easy. Metal lies flat and you see shapes formed. Weight 68 lbs. Price \$35.00. With standard \$37.25, f.o.b. factory.



MAPLEWOOD MACHINERY CO., INC.
2636 Fullerton • Chicago, Ill.



ANSWERS
All
TOOL STORAGE
PROBLEMS

Write for Free Copy

LYON
METAL PRODUCTS, Inc.
1310 River St., Aurora, Ill.

AUTOM

CONTINUOUS HINGES



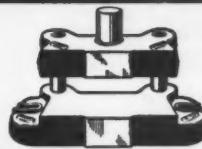
Manufactured by

**AUTO MOULDING
& MFG. CO.**

2326 S. CANAL ST. CHICAGO

WRITE FOR STOCK LIST

BAUMBACH



STANDARDIZED

DIESETS

Machined Steel

Semi-Steel

DROP FORGED STEEL

Standardized Die Sets, embodying many exclusive features, a listing of more than 185,000 stock sizes and 46 different styles afford a service that is unsurpassed.

Send for Our New 288-Page Catalog
E. A. BAUMBACH MFG. CO.

1806 S. Kilbourne Ave. Chicago, Ill.

**AMERICAN
SWISS PATTERN FILES**

Made in the U. S. A.

Will Always Make Good In Your Shop

Manufactured by the most skilled mechanics to the closest possible dimensions. 2,500 different shapes, cuts and sizes to choose from.

Look for this mark on the tang of a File



AMERICAN SWISS FILE & TOOL CO.
ELIZABETH, NEW JERSEY

SWISS PATTERN FILES AND RIFFLERS

*Buy from
the
Distributor*

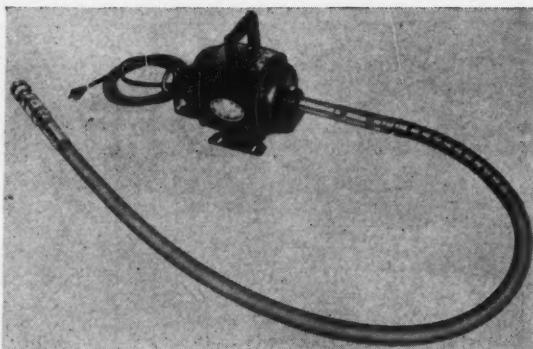


setting is made on this lip as on the first one and the cam handle is pulled without touching any of the feed screws.

Stow "Combination" Flexible Shaft Machine

Expansion of the Stow "Junior" line of flexible shaft units to include a combination tool has been made known by Stow Manufacturing Company, Inc., 1 Shear St., Binghamton, N. Y. This Model AJ machine consists of motor, flexible shaft, clamp spindle, and extension cord and plug.

The "Combination" model is for both bench and portable use, being fitted with conventional base and also with carrying handle. With its compactness and light weight, the tool can be operated in close quarters, wherever a work-



Stow "Combination" Flexible Shaft Machine

man himself can go. Its principal application is to grinding, light drilling, polishing, sanding, and filing operations. The same attachments are available as furnished for Stow heavy-duty machines. The motor offers four choices: $\frac{1}{4}$ h.p., 1,750 r.p.m.; $\frac{1}{4}$ h.p., 3,400 r.p.m.; $\frac{1}{2}$ h.p., 1,750 r.p.m.; $\frac{1}{2}$ h.p., 3,400 r.p.m.



Universal Die Cushions for deep drawing, forming die, pressure pad control, and blanking die stripper actions.

*Write for engineering
power press die
booklet.*

**DAYTON ROGERS MFG. CO.
MINNEAPOLIS • MINNESOTA**

THE LATEST DEVELOPMENT IN SIMPLIFIED THREADING

SAVES time, costs
and trouble . . . INSURES
production. Write for NEW
BULLETINS showing how to solve
threading problems.

**EASTERN MACHINE
SCREW CORP.**
38-58 Barclay St.
NEW HAVEN, CONN.



**H & G
DIE HEAD**

HINGES
VARIOUS WIDTHS
and GAUGES



BUTTS AND
CONTINUOUS LENGTHS

WRITE FOR PRICES

S & S MACHINE WORKS
4541 W. LAKE STREET HARDWARE DIVISION CHICAGO, ILLINOIS

For
**GUARDS
CABINETS
CASES
BOXES**

No Mushrooming ▶
 No Chipping ▶
 Oversize Shanks ▶
 Exclusive Knurled Back ▶
 Exclusive Thumb Grip ▶
 Broach- Rounded ▶
 Corners

and
 a
 complete
 line of
 Marking
 Devices

Write for Price and
 data Bulletin No. 113-12.

NEW METHOD STEEL STAMPS, Inc.

149 Joseph Campau, Detroit



Standard or Special Drills

CIRCLE "R" combination center drills are cost-cutting production tools. Special alloy and high speed steel. Write for catalog.

CIRCULAR TOOL CO., Inc.

767 ALLEN AVENUE
 CHICAGO CLEVELAND DAYTON TOLEDO

INDIANAPOLIS NEW YORK SYRACUSE

PROVIDENCE R. I.
 PHILADELPHIA PITTSBURGH ST. LOUIS

ALIKE

in Strength and Uniformity

Many years of experimentation and continued manufacture lie behind



SOCKET SCREWS

The steady adoption of the latest practical alloy metals . . . improved methods of heat treating . . . the use of finest precision machines plus laboratory-like control and inspection, assures perfect fitting every time and highest degrees of strength with toughness. All these factors are your assurance of 100% satisfaction with every "Unbrako" Socket Screw Product.



Fig. 1434 Knurled
 "UNBRAKO"
 Socket Head Cap
 Screw. Pat. Pending.

Write for New
 "UNBRAKO"
 Screw Products
 Catalog



Fig. 232
 "UNBRAKO"
 Hollow Set
 Screw.

STANDARD PRESSED STEEL CO. JENKINTOWN, PENNA.

Boston
 Detroit
 Indianapolis

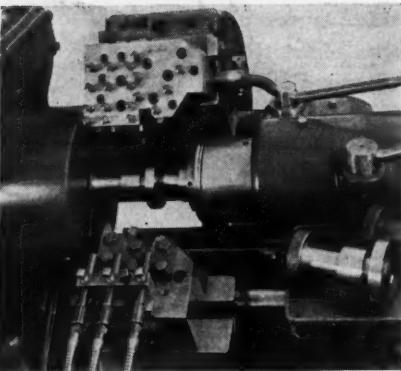
BOX 556

Chicago
 St. Louis
 San Francisco

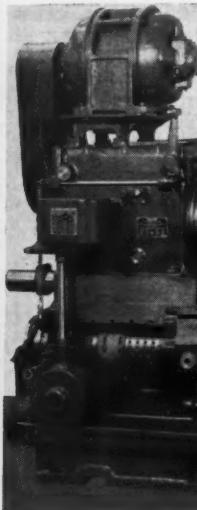
Additions to Jones & Lamson Line

The Jones & Lamson Machine Co., Springfield, Vt., has added to its line of machine tools the 16-in. Fay Automatic Lathe, 6 x 36-in. Thread Grinding Machine, and No. 7A-5 Saddle Type Universal Turret Lathe shown in the illustrations.

The 16-in. Fay Automatic Lathe is a heavy duty machine designed to take full advantage of modern hard alloy cutting tools, and will transmit power in excess of 50 h.p. It is provided with an extra large low chip pan and is furnished in five standard lengths with a capacity between centers of 23, 35, 53, 71, and 89 in. respectively.



Lathe showing machine tooled for rough turning and facing a cluster gear.



J&L 16-In. Fay Automatic Lathe

The machine will swing 12½ in. over the carriage and 17¼ in. over the center bar and back bar, and has eight spindle speeds ranging from 28 to 180 r.p.m., obtained through a standard set of change gears.

The J&L 6 x 36-In. Automatic Thread Grinding Machine will grind threads up to 6½ in. maximum diameter, using a 20-in. wheel. It will swing work of 7½-in. maximum diameter, will accommodate work 36 in. long between centers, and will grind threads 12 in. long at one setting. Three types of automatic trueing devices are available; 60 deg. for all Na-

"OUTWEARS
the best
Bronze Metal"

20 years ARGUTO without a drink

ARGUTO OILLESS BEARING CO.

Wayne Junction, Philadelphia, Pa.

Mark It Quickly with a NUMBERALL

Made with 1 to 10 wheels.
Stamp in perfect alignment.
Shank for Hand or Press
Stamping. Platform for stamping
Name Plates and other small
articles.

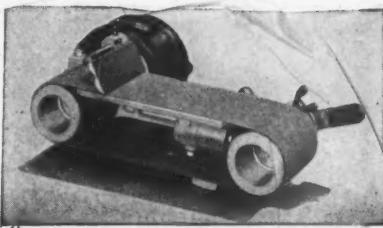
No. 45
Platform



NEW Quick Set Machine. One wheel can be turned quickly by knurled knob for consecutive numbering.

NUMBERALL STAMP & TOOL CO.

Huguenot Park,
Staten Island, N. Y.



•NEW ABRASIVE BAND GRINDER . . .

"Built Like a Machine Tool"

The Hormel-M Grinder is sturdily built with a supporting leg under the grinding table to eliminate vibration and tipping due to pressure on the belt. Ball bearing throughout. Equipped with ALEMITE LUBRICATION complete with grease gun.

Write for illustrated folder on this and other styles and sizes.

HORMEL-M GRINDER

WALLS SALES CORP.
96 WARREN ST. NEW YORK, N. Y.

**YOU CAN PREVENT MACHINERY BREAKDOWNS
and CUT YOUR MAINTENANCE COSTS by using
The Set Screws with "The Third Factor"**

UNBRAKO

**are 1. STRONG 2. ACCURATE
and 3. WON'T SHAKE LOOSE**

When you use these screws you're insuring against a heap of trouble. Gone is the need to continually check-up on set-screws...you just know they're tight all the time, and as they do stay that way no trouble can follow. The clever knurling on the points locks them in place, once they're set up in the usual way. Removal is easily made with the ordinary hex bar wrench when adjustments are needed and the screws re-used any number of times. Write now for samples and literature.

**SELF-LOCKING
HOLLOW SET SCREWS
with the Knurled Points**



Fig. 1641
Pat's. Pend'g.



Fig. 1645

STANDARD PRESSED STEEL CO.

BRANCHES

BOSTON

Detroit

INDIANAPOLIS

JENKINTOWN, PENNA.

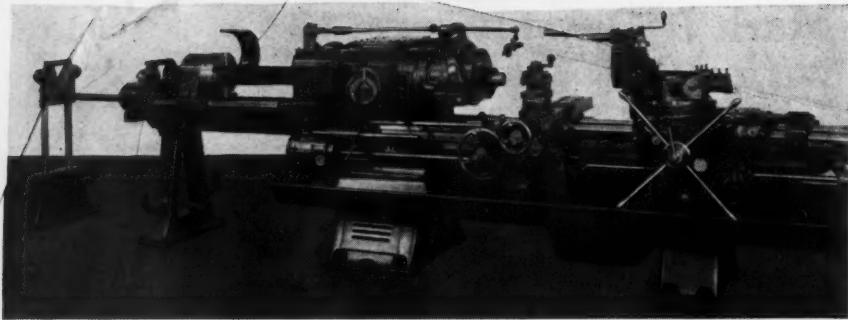
Box 556

BRANCHES

CHICAGO

ST. LOUIS

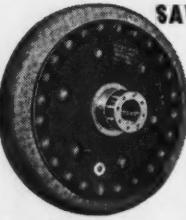
SAN FRANCISCO



J&L No. 7A-5 Saddle Type Universal Turret Lathe

tional and metric thread forms, universal, and pantograph. Other features include a rheostat control of grinding wheel speeds, automatic wheel dressing, automatic compensation for amount dressed off wheel, automatic in-feed of wheel on successive cuts, automatic sizing, relieving attachment for use on taps, hobs and similar tools, and hob grinding attachment for grinding annular grooves.

The No. 7A-5 J&L Saddle Type Universal Turret Lathe was designed to meet the demand for a turret lathe with a large spindle bore for machining large diameter tubing and other similar work that does not require a large swing chucking capacity. The swing over the ways on this machine is 19 in. and the swing over the carriage cross slide is 13 in. Round bar capacity, 5 in. Scroll chuck capacity, 12 in. Type B1 Amer-



SAVE YOUR FLOORS
RE-WHEEL YOUR
TRUCKS WITH
END WOOD
WHEELS
Easy Rolling
Long Wearing
Sizes for all trucks.
Casters for all
purposes.
Full Information FREE
METZGAR CO.
112 Logan St. S. W.
Grand Rapids, Mich.
U. S. A.

Hyatt Roller Bearing
Heavy Duty

ALL ALLOY PORTABLE SHEARS
FULLY GUARANTEED



Two Sizes

No. 1 cuts up to No. 11 gauge strip or sheet.
No. 2 cuts up to $\frac{1}{4}$ " steel plate.
Special Blades for shearing stainless steel.

BREMIL MFG. CO.
1725 Pittsburgh Ave. Erie, Pa.

For DRILL PRESS • Often used on Miller, Shaper or Planer



Fig. 2. Without
Jig Attachments

VISE

With and Without
Jig Attachments
6", 9" and 12" Jaws

All Vises are drilled to
take Jig Attachments.
Attachments mean much
drilling—small Jig cost.

Send for Circulars

THE GRAHAM MFG. CO., PROVIDENCE, R. I.

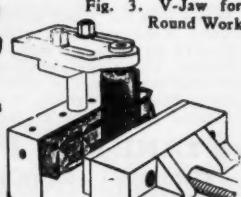


Fig. 3. V-Jaw for
Round Work

FOR SEVERE SPINDLE END THRUST



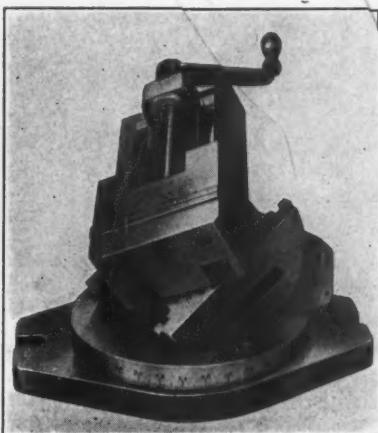
Heavy race sections and deep grooves give this Auburn Bearing unusual capacity and life. Easily installed—requires a minimum of machine work for its use.

Write for complete catalog listing stock sizes and load ratings.

AUBURN BALL BEARING CO.

69 CLARISSA ST., ROCHESTER, N. Y.

**GET FREE FOLDER
ABOUT THIS VISE**



The WESSON *all Steel* UNIVERSAL VISE

is a machine tool fixture you need! Produces accurate compound angles more quickly, more easily. Reduces set-up time; eliminates tedious makeshift measuring. Accurately graduated in all planes. Rugged "cradle" design and all-steel construction give greater rigidity; permit faster stock removal. Also furnished with slotted surface plates.

Mill Supply Distributors: We have inquiries from all sections of the country. Profitable territories available. Distributor and dealer inquiries invited.

FREE FOLDER COUPON

WESSON CO., 1050 Mt. Elliott, Detroit

Please send me illustrated Folder covering the Wesson Universal Vise.

Name.....

Firm.....

Address.....

City..... State.....

SHEAR-CUT END MILLS

Here is a complete line of
Single and Double
End Mills.

They save time and money.

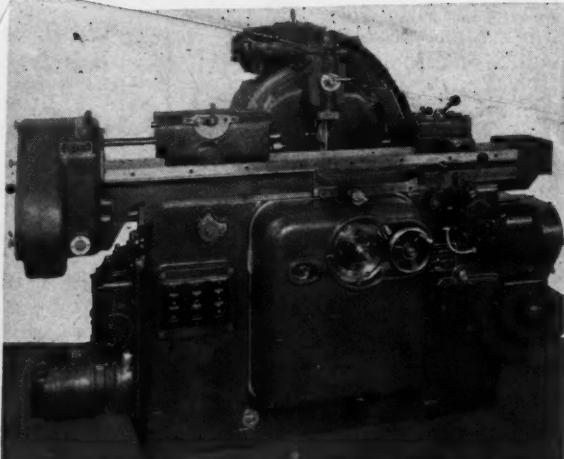
Specify Progressive
Shear-Cut End Mills.
Write for catalog and prices.



PROGRESSIVE TOOL & CUTTER CO.

2345 WOLCOTT ST. • FERNDALE, MICH.

J & L 6 x 36-In. Automatic Thread Grinding Machine



American Standard Lathe spindle nose is 11 in. in diameter.

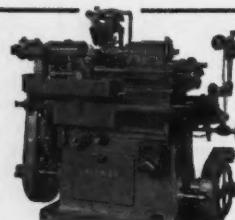
The No. 5 Ram Type Universal Turret Lathe can be supplied with 5-in. spindle capacity with 2½-in. capacity bar turret tools. The No. 8A Saddle Type Universal Turret Lathe can be furnished with 5-in. spindle capacity with 3-in. capacity bar turret tools.

Wilson "Hornet" Electric Arc Welder

A single operator motor-generator arc welder requiring only one control device on top of the unit. Adjustment of this

for operation has been announced by Wilson Welder and Metals Company, Inc., 60 E. 42nd St., New York, N. Y.

Known as the Wilson "Hornet," this welding machine employs for its control a single, simple handwheel located



BECHLER
AUTOMATIC SCREW MACHINES
Give Fastest Speeds Unusual Precision Simple Set Ups
Send for Catalog.

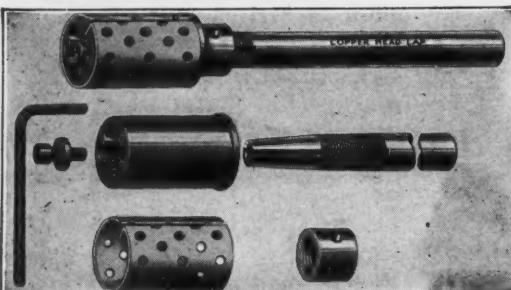
TRIPLEX MACHINE TOOL CORP.
131 BARCLAY ST.
NEW YORK CITY

GRAY TURRET HEAD METAL CUTTER OR NIBBLER
Cuts all metals any shape—
30 gauge up to 1".



GRAY, Originator of First Practical Metal Cutter or Nibbler. GRAY Cutters Still Lead.

GRAY MACHINE CO.
Dept. A P. O. Box 596
Philadelphia, Pa.



LOWER YOUR LAPPING COSTS

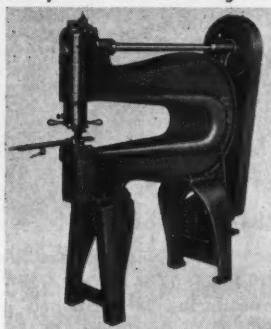
With Copper Head Expansion Laps. Profitably used in hundreds of leading shops. Available in sizes from $\frac{3}{8}$ " to $2\frac{1}{2}$ ", graduated by sixteenths of an inch. Many other designs for special applications.

WRITE FOR BULLETIN

Boyar - Schultz Corporation
2120 Walnut St.
Chicago, Ill.

SAVAGE NIBBLING MACHINES

Powerful Direct-Over-Center Drive
Totally Enclosed Revolving Head



Cuts Stainless Steel, Brass, Copper, Aluminum, Mild Steel and Other Materials. Capacities to $\frac{1}{8}$ "—Throat Depths to 36"

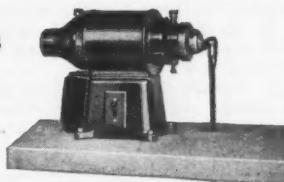
W. J. SAVAGE COMPANY

KNOXVILLE Since 1885 TENNESSEE
Pioneer Manufacturers of Nibbling Machines

SCHAUER Speed Lathes

PRODUCTION NECESSITIES

TIME
SAVERS
IN
ANY
PLANT



Designed especially for reducing time of secondary operations as lapping, polishing, filing, finishing and burring of small parts. Equipped with 2 speed motor—automatic brake—collets or 3 jaw chucks—hand operated or automatic. Many interesting applications shown in Cir. No. 380
—Write for it.

SCHAUER MACHINE CO.
2060 READING RD., CINCINNATI, OHIO

Have Room to "MOVE AROUND" in your shop "ROTABIN" Saves you 50% floor space

Large and small businesses alike have been quick to realize the importance and profits to be gained from "roomy" space in their tool and stock rooms.

Rotabin equipment eliminates long rows of shelving and half the aisle space. The rotating sections bring all parts to you mechanically and quickly. Let us survey and recommend equipment for your needs — no obligation. Write today for information.

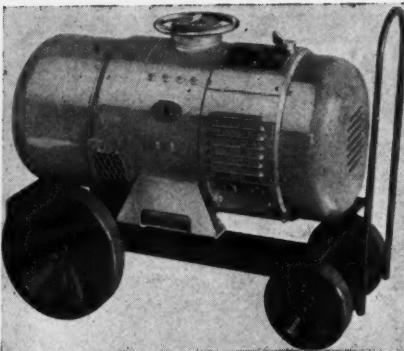


THE FRICK-GALLAGHER MFG. COMPANY
WELLSTON • OHIO

handwheel permits the operator to obtain an infinite number of current settings. Dial markings are so accurately calibrated that meters are not required.

Single-pole control design assures a current output that will not vary, resulting in a constant, uniform arc at all times. Accidental reversal of polarity is impossible because the electric current is so designed that a small snap switch must be flicked by the operator to change the polarity.

The Hornet is a two-bearing unit, with motor rotor and generator armature mounted on a common shaft. Ade-



Wilson "Hornet" Electric Arc Welder

G E A R S
Good Gears Only
All Kinds
Any Quantity
AT THE RIGHT PRICE
THE CINCINNATI GEAR CO.
1825 Reading Road Cincinnati, Ohio

Clean,
SHARPLY DEFINED
Scribed Lines
SECURED QUICKLY, EASILY
AND ECONOMICALLY WITH
Micicro Supreme
LAY-OUT DYE

TRIAL OFFER: A handy five-ounce Combination Brush-In-Can ideal for shop use and for trial purposes...for only 40¢

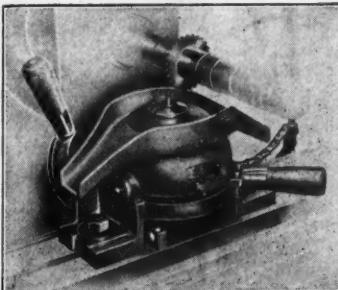
MICHIGAN CHROME CO.
6346 E. JEFFERSON AVE., DETROIT, MICH.

quate ventilation is furnished by propeller blades attached to the revolving shaft. Although shielded arc electrodes are recommended, the Hornet will operate efficiently where bare electrodes are used. The Hornet is supplied in three sizes: Frame BA 200, rated 200 amperes; Frame BA 300, rated 300 amperes; Frame BA 400, rated 400 amperes.

Willey's No. K-24 Tungsten Carbide Tool Grinder

In response to a demand for larger grinder than the No. K-20 which has previously been built by Willey's Carbide Tool Co., 1340 W. Vernor Highway, Detroit, Mich., this firm has brought out the No. K-24 illustrated herewith. The design of the No. K-24 is said to embody all the latest improvements that have been found essential for grinding tungsten carbide tools accurately and economically. The grinder

PRESSES
FEEDS
AUTOMATIC
EQUIPMENT
THE V&O Press Co., Inc.
HUDSON N.Y.



DEARBORN Automatic Chucking and Indexing Fixture

MILLS OVER 1000 PARTS PER HOUR

Work held by draw in collets. Collets open and close automatically. Work automatically ejected. Indexes without loss of time for milling 1, 2, 3, 4, 6, 8, 12 or 24 sided pieces. Minimum set-up time required. Speeds up production. Positive and accurate in operation.

J. W. DEARBORN
70 S. CLIFF ST. • ANSONIA, CONN.

NEW



MODEL 11023-E "GUSHER" Coolant Pump

Arranged for flange mounting against a pad on the side of the machine coolant reservoir. A 3" x 5 1/2" pump inlet opens directly into the reservoir providing unrestricted gravity flow. The pump discharges through an outlet in the center of this intake opening, making connection internally and confining the piping or delivery passages to the inside of the machine housing.

This new "GUSHER" Pump supplies up to 85 gallons of coolant per minute. Write for complete details.

ACME
Standardized
JIG BUSHINGS



Acme Standard over 6700 Items
A.S.A. Standard over 4200 Items

Acme Drill Jig Bushings are made by the most exacting, scientific methods—insuring long wear, accurate fit, and absolute satisfaction. A standardized product, carried in stock for prompt delivery in over 10,900 standard items—all completely finished and ready for use. Special sizes made to order.

SEND for BULLETIN
CONTAINING COMPLETE
DATA and LOW PRICES

Acme INDUSTRIAL CO.
212 N. Laflin St. Chicago, Ill.

The Ruthman Mach'y Co.
538 E. Front St. Cincinnati, Ohio

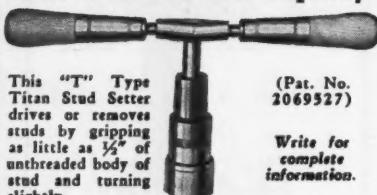
is powered by a special $\frac{1}{2}$ h.p. ball bearing induction type motor, with 110, 220, or 440 volts, 60 cycle, single or three-phase, 3,450 r.p.m. The shaft is tapered at each end, thus assuring positive wheel alignment. A thrust collar on one end of the motor shaft provides for end bearing adjustment. The diamond wheel is lubricated by a gravity feed device that saturates a felt retainer pad which is in constant contact with the wheel. Tool rest tables are of semi-steel, accurately machined with quick clamping features. The table

is adjustable to 30 deg. from horizontal position.

The tool rest table is 16 x 7 in. Diamond holder, $\frac{3}{8}$ x $1\frac{1}{2}$ in. Height of spindle above floor, 43 in. Wheel size



SET STUDS "The Roll Grip Way"



This "T" Type
Titan Stud Setter
drives or removes
studs by gripping
as little as $\frac{1}{2}$ " of
unthreaded body of
stud and turning
slightly.

(Pat. No.
2069527)

Write for
complete
information.

Titan Tool Co., Fairview, Pa.



DRILL THESE HOLES

By a Quick, Easy, Inexpensive Method
Your business letterhead will bring literature.

WATTS BROS. TOOL WORKS
WILMERDING, PA.

Willey's No. K-24 Tungsten Carbide Tool Grinder

with steel back, $8 \times 1\frac{1}{4} \times 1\frac{1}{4}$ in. Diamond wheel, $6 \times \frac{3}{4} \times 1\frac{1}{4}$ in. Speed of the 8-in. wheel, approximately 7,000 r.p.m. Speed of 6-in. diamond wheel, approximately 5,000 r.p.m. Floor space required, 40 x 18 in. Net weight, 400 lbs. Standard equipment includes two 8-in. vitrified silicon carbide wheels, protractor, and diamond dresser.

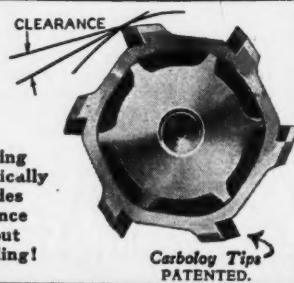
No Other Reamer Saves You This!

Staples reamer eliminates regrinds after re-sizing. Provides parallel and equal outward expansion of tips, free cutting action and long life. Customers report as many as 30,000 smooth, accurate holes in low carbon steel without resharpener. Write for leaflet. Sold thru Carboly Co., or direct from—

STAPLES TOOL & ENGINEERING CO.
Cincinnati, Ohio

STAPLES

Re-sizing
Automatically
Provides
Clearance
Without
Regrinding!
Carboly Tips
PATENTED.



ental
Dia-
size

KENNAMETAL Remover

60% TO 174% MORE STOCK
PER MINUTE



The table below was compiled from figures in the machining of S.A.E. 1045, a typical carbon steel in common use. Note that in this instance KENNAMETAL cuts from 3-1/3 to 5-5/7 times as fast, with 2-3/5 to 6 times as many pieces per grind, and removes 60% to 174% more stock per minute.

High Speed Steel Cobalt Chrome Alloy KENNAMETAL

Speed (ft./min.)	70	120	400
Feed (inches)	.0625	.0625	.030
Pieces per Grind	10	25	60
Depth (inches)	5/16	5/16	5/16
Stock Removed (cu.in./min.)	16.40	28.00	45.00

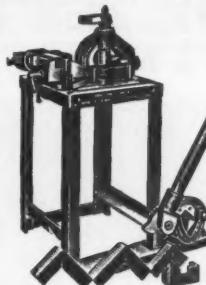
KENNAMETAL will machine **steel** heat-treated to 550 Brinell while combining roughing and finishing in one operation. Write today for catalogue; also new chart of "Materials Machined with KENNAMETAL."



MCKENNA METALS CO.
300 LLOYD AVENUE
LATROBE, PENNSYLVANIA, U.S.A.

No. 455 Angle Iron Combination

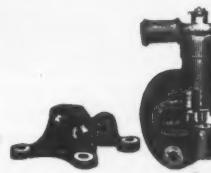
Shears, Notches
and Bends a 2"
x 2" x 1/4" angle
iron in one minute
flat.



Write for cata-
log on entire
line.

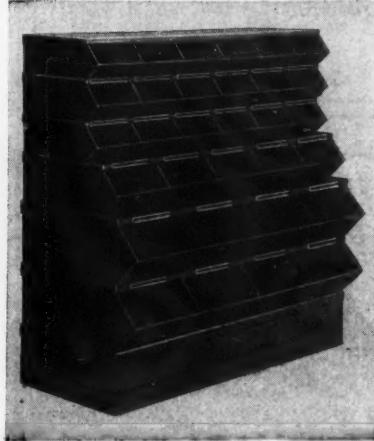
No. 20 BALL BEARING PUNCH

Capacity 1/2" thru
1/4" iron.



Whitney Metal Tool Co.
110 FORBES ST. ROCKFORD, ILL.

A CONVENIENT STOCKROOM --WHEREVER YOU NEED IT!



When the work demands handy parts or materials, set up a STACKBIN stockroom AT THE JOB—and have everything you need within arm's reach. STACKBIN sections nest together as easily as a sectional bookcase—quickly form storage units of any size or capacity—keep parts and materials right where you need them.

Write Stackbin Corp., 58 Troy St., Providence, R. I. for full details and prices—see how easily you can improve handling with patented STACKBIN sections.

STACKBINS
"STACKED AND STILL ACCESSIBLE"

"Buffalo" Type L Breezo Fan

For use where a propeller-type fan is necessary but where the motor must be outside of the air stream, the Type



"Buffalo" Type L Breezo Fan

L Breezo Fan shown here has been brought out by Buffalo Forge Company, 388 Broadway, Buffalo, N. Y. The fan is built of standard, readily interchangeable parts, so that the unit may easily be arranged to fit into any system. The fan is especially designed for

SEVERANCE TUBE BURRING CUTTERS ARE DESIGNED EXPRESSLY FOR THE JOB



Severance Tube Burrin Cutters burr or chamfer tubing both inside and outside in one operation. In a shearing cut which forces the chips out and prevents loading, these cutters quickly and easily finish tubes in sizes from 1/16" O.D. and up. Submit your tube burring, reaming, chamfering and end sizing problems to our engineers or ask for Bulletin 12T.

Severance Tool Manufacturing Co.
1515 East Genesee Ave. Saginaw, Mich.

exhausting spray from paint spray booths, chemical plants, and other places where an excess of moisture, dust, heat, or fumes is to be removed.

The motor, V-belt, pulleys, and one bearing of the fan are entirely outside the path of the air. The bearing at the fan end of the shaft, which is in the air chamber, is of bronze, enclosed wool-packed, requiring oiling about once in two thousand hours of use. When desired, enclosed ball bearings packed in grease can be furnished. Housing are so designed that the air inlet may be at the top, bottom, or either side of the unit and may be changed from one side to the other on the job if necessary. The fan is made in sizes from 12 to 36-in., to operate at speeds of 1,725 r.p.m. for the 12-in. down to 600 r.p.m. for the 36-in. and to deliver from 1,080 to 10,800 cu. ft. of air per minute.

Littell Automatic Centering Reel for Coils Up To 4,000 Lbs.

Expanding its line of heavy duty reels to a much wider range of capacities, the F. J. Littell Machine Co., 4127 Ra-

CENTERLESS GRINDING

Accuracy—Prompt Service

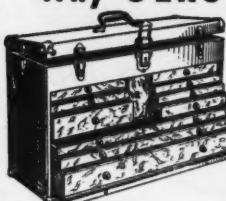
Commercial Centerless Grinding Co.

6538 Carnegie Ave., Cleveland

Why GERSTNER?

For long service
For honest value
For modern design

See the many
styles in our
free catalog.



1239 COLUMBIA ST.

**GERSTNER
Tool Chests
DAYTON, OHIO**

Gear Specialties

14
to
96
D.P.

14
to
96
D.P.



—IN THE SMALL RANGE—Spurs, Spirals,
Bevels, Worm Gearing, Racks, Ratchets, etc.
High precision or commercial production.
Made to order ONLY—No Stock—No Catalog.

Gear Specialties

INCORPORATED
CHICAGO

2620 W. Medill Ave. Phone-Humboldt 3482

MORE
LIGHT



BETTER
SIGHT

with VIMCOLIGHT

VIMCOLIGHT puts the light right on the work—so your men can see better, do better work.

There's a VIMCOLIGHT for every type of machine. Write for complete information.

VIMCO MFG. CO., INC.
111 CHENANGO ST. BUFFALO, N.Y.

In Both **BRONZE**
and **STEEL**



SUTTON FEED FINGERS

In Bronze. For screw machine jobs that demand complete elimination of scratching the work specify Sutton standard-design Feed Fingers made of bronze. The bronze is specially selected to provide full-powered spring tension for sure feeding.

And Steel. For general purpose work specify Sutton Feed Fingers of steel. They are expertly heat-treated to insure spring temper with a long and strong come-back.

◆◆◆
Always remember Sutton DIAMOND-GRIP Collets are perfect partners for Sutton Feed Fingers. Their clean-cut Diamond Serrations give a surer grip under less tension.

Ask for Complete Sutton Catalog

Sutton Tool Company

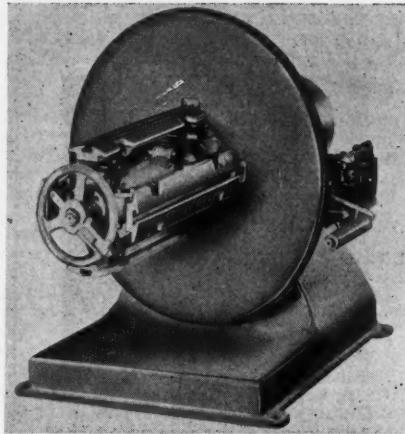
2842 W. Grand Blvd., Detroit, Mich.
Represented in Canada by
HI-SPEED TOOLS, Ltd., Galt, Ont.



Accessories for Screw Machines

venswood Ave., Chicago, Ill., announces the No. 40 Littell Automatic Centering Reel for handling coils weighing up to 4,000 lbs., 20 in. wide. The reel is for use in punch press shops, is self-centering, and especially suited for unwinding and rewinding light-gauge materials. Reels of this type are necessary for use with thin materials to prevent the rolling of the edges which occurs in cradle-type coil cradles. It is designed for operation in conjunction with punch press feeds and also with slitting operation.

The winding drum is readily expandable through the handwheel shown at



New Nesting Type Tote Pans



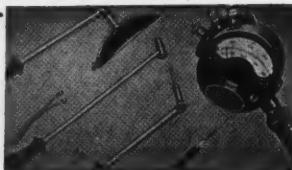
Lots of 50
\$1.00 each

20" long x 12" wide x 6½" deep.
16 ga., drag holes and handles both ends.

Lots of 100 & 200 less 3%; 300 up less 5%

J. L. LUCAS & SON, INC.
1 Fox Street Bridgeport, Conn.

PYRO

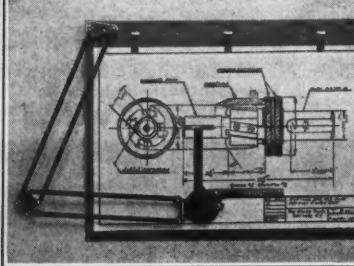


SURFACE PYROMETER

Ideally suited for any surface or inside temperature readings. A single indicator with four different interchangeable elements. Write for bulletin 120. Booth J-331. Nat'l Metal Exposition, Chicago.

THE PYROMETER INSTRUMENT CO.
101-105 Lafayette St. New York

DRAFTO



Littell Automatic Centering Reel for Coils up to 4,000 Pounds

the front of the illustration. It has a normal expansion range of 2 in.; i. e., from 14½ to 16½ in. Chairs can be provided for handling larger coils. The reel is mounted on an all steel welded base. It is equipped with a 3 h.p., 1,200 r.p.m. NEMA frame motor, and driven through an enclosed self-contained worm drive. Approximate weight of the reel is 2,250 lbs. When this unit is used for unwinding material to slitters, the motor drive is omitted and the reel is equipped with a large brake.

The reel is an addition to the Littell line of self-centering reels and extends the capacities of this line from 300-lb. range up to 4,000-lb. capacity. The particular advantage of this type of reel is that the coil is always in balance and therefore is well suited for use with high speed automatic punch presses.

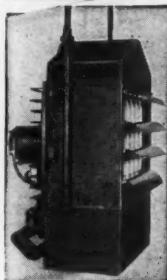
DRAFTO MACHINES are complete units for use in Office, Shop, Home and School. Equipped with horizontal and vertical scales and 180 degree protractors. Mounted on special tempered Masonite Boards fitted with sturdy paper clamps. Size 10-H fits brief case; dwgs. up to 9x12 in.—\$4.50. Size 15-V for patent dwgs., charts, graphs; dwgs. up to 10x15 in. in vertical position—\$6.25. Size 20-H for desk use in office, shop, home, or school; dwgs. up to 12x18 in.—\$9.50. Postage prepaid on cash orders. \$1 must accompany C.O.D. orders.

Write for Catalogue on larger sizes.

THE DRAFTO CO. Cochranton, Penna.

Midwestern Branch:
1048 N. Lockwood Ave., Chicago, Ill.

EFFICIENT HEATING



means

EFFICIENT WORKMEN

Make your workmen more efficient this winter. Replace your old heating system with Pittsburgh Gas-Fired Unit Heaters. Complete units in themselves, these heaters

ers operate without steam or water, need only gas and electric outlets, and use no valuable floor space. They are completely automatic in operation and can be used as fans in summer as well as for heaters in winter. Find out about Pittsburgh Unit Heaters—how they can increase efficiency in your plant and at the same time cut down heating costs. Write for new descriptive literature.

AUTOMATIC *Gas Steam* RADIATOR CO.
470 Brushton Ave. Pittsburgh, Pa.

KNOCK-OUT

Chucks

Will save you Money

Keyless



Slip-proof

because (1) of time saved in chucking and changing drills, (2) they are slip-proof, permitting heavier feeds, (3) they do not "chew" or score drill shanks, (4) they are built for heavy duty and long life.

Send for bulletin No. DC38M and ask about our FREE TRIAL.

K. O. LEE & SON CO.

Aberdeen, So. Dak.

"practical tools for practical men"



YOU DON'T BUY TAPS

You buy *threads, tap life and the profits* that taps give you.

Compare BUTTERFIELD TAPS with other taps for accurate threads and long life. The difference will reveal the superiority of BUTTERFIELD TAPS and their profit possibilities.

Union Twist Drill Company
BUTTERFIELD DIVISION
DERBY LINE • VERMONT



NEW YORK
CHICAGO
CLEVELAND
DETROIT

61 Read St.
11 S. Clinton St.
3346 Superior Ave.
6540 Antoine St.

U. S. Lubriflush Lubricating System for Motor Bearings

The illustration shows how motor bearings are lubricated by the use of the U. S. Lubriflush System which has been developed by U. S. Electrical Motors, Inc., Dept. 90, 80 34th St., Brooklyn, N. Y. This system is so designed that, when new lubricant is applied to the bearings, the bearing chamber is purged of the old lubricant, assuring the application of new, clean grease to the bearings.

Through a tube leading from the outside of the motor, the lubricant is injected with a pressure gun. As the new lubricant is injected, the old lu-



DANLY DIE SETS

Precision
Commercial
Special



Danly Machine
Specialties Inc.
2130 S. 52 Avenue, Chicago

DANLY DIE MAKERS' SUPPLIES

HOLD-HEET

says When!

A Sturdy, Dependable
Lance Pyrometer
Shows you the correct tem-
peratures in heat treating,
annealing, tempering, clay
baking, salt baths, tempering
and annealing solutions. Ends
costly guess-work.

Write for Circular
RUSSELL ELECTRIC CO.
338 W. Huron St. Chicago, Ill.

Hold-Heet Pyrometers

Thermocouples
\$1 to \$4 extra.

ONLY
\$16
10
DAYS
FREE
TRIAL

IT TURNS WITH THE WORK



STURDIMATIC CENTERS ELIMINATE
CHATTER AND FRICTION

8 years continuous use has
proved its value.

Sturdy radial and thrust bear-
ings insure rigidity and load
capacity.

Write for catalog and free
trial offer:

STURDIMATIC TOOL CO.
5222 THIRD, DETROIT



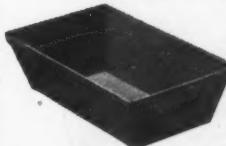
TANNEWITZ

Abrasive Cut-off Machine

Uses Abrasive Wheels or Saws, and instantly swivels and cuts any angle from 45° left to 45° right, doing clean, instantaneous work on metal bars, shapes or tubes.

THE TANNEWITZ WORKS
Grand Rapids, Mich.

We Fill Your Steel Shop Equipment Needs



Write to us for complete catalog on barrels, kegs, pails, racks, shelving, etc. We design for service and durability.

The CLEVELAND WIRE SPRING Co.
CLEVELAND • OHIO



Janette Speed Reducers

43 SIZES FROM 1/50 TO 10 H.P.
Speeds from .0083 to 1140 r.p.m.

The diversity of Janette motorized and motorless reducers enables you to select the style of compact, rugged speed reducer, to exactly meet your individual requirements.

May we give you complete information?

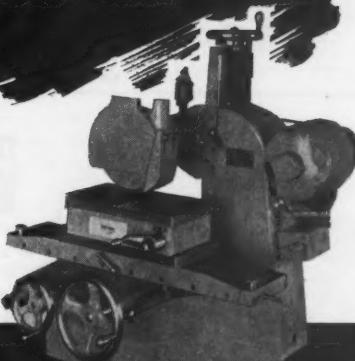
Janette Manufacturing Company
556-558 West Monroe Street
Chicago

BERGRAM PRESENTS A NEW SURFACE GRINDER

This bench type surface grinder (Type S-1) has a permanent magnetic chuck with grinding surface 5" x 10"—no wires or generators. Electro-magnetic chucks can be furnished.

Interchangeable pulleys compensate for wheel wear. An adaptor is furnished for mounting small wheels for groove grinding.

WRITE FOR COMPLETE DETAILS.

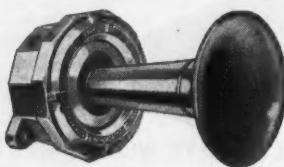


Bergram Mechanical Engr. Co., Inc.

18 HARTFORD AVE.

NEW BRITAIN, CONN.

The increased sound volume of the unit is obtained without any increase in current consumption. The improved signal is obtained through a new system of tone control and pitch com-



Benjamin Tone Signal

bined with an improved design for sound amplification. The entire assembly plugs into a base socket in much the same way as an ordinary appliance plugs into a wall outlet.

Albanene Tracing Paper

An entirely new type of tracing paper combining the transparency of oil treated sheets with the permanence of natural 100 per cent rag papers is a recent development of the Keuffel & Esser

Company, Alba N. J. The new paper is named Albanene. It is made of long fiber clean white rags, and it is treated with a new crystal clear synthetic solid called Albanite, in the K&E laboratories. Because this new transparentizing agent is free from oil and wax and both chemically and physically inert, it is claimed that Albanene will not oxidize, turn yellow, become brittle, or lose transparency with age.

According to the manufacturer, the new chemical has remarkable penetrating power so that an extremely long fiber base paper can be used, giving Albanene an unusually high strength factor by all standard paper tests. The ability of Albanite to penetrate "wild" fibers gives Albanene unprecedented transparency and superior blue printing quality, the manufacturer states.

It is further claimed that the use of this new type transparentizing agent permits a fine toothed, smooth drawing surface that takes strong pencil lines with a minimum wear on the point. On Albanene all lines are held by the fine hard tooth and do not become embedded in the paper structure, making

Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS

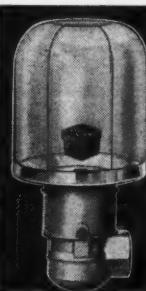


Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 7 sizes U.S.S.—Inexpensive—Last for years.

Write for Circular

**NIELSEN TOOL &
DIE COMPANY**
1863 Gardner Ave.
Berkley, Mich.

NEW *Unbreakable* OILERS



TRICO OILERS maintain a constant level of oil in bearings. No guesswork, bearing failures, waste of oil or grease, oil-soaked motor windings, fire and accident hazards. A wonderful investment.

Write for Bulletin #25

TRICO FUSE MFG. CO.
Milwaukee, Wisconsin



DON'T THROW AWAY VALUABLE CARBIDE TIPPED TOOLS \$\$\$

- Write at once for our folder on CARBIDE TOOL SALVAGE.

Tips Remounted — Shanks Retipped — Round Tools Expanded to Size — Grinding — Lapping

*Carbide Tool Salvage Division
SUPER TOOL COMPANY*

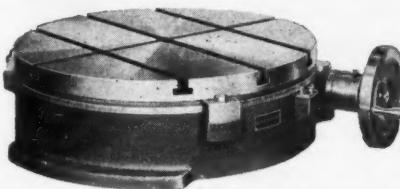
21650 Hoover Rd.

Detroit, Mich.

Albanene is offered in three weights—light, medium, and heavy. An illustrated brochure and a generous working sample of this new paper can be secured by writing to the manufacturer.

Troyke Rotary Table

Alfred A. Troyke, 219 E. 2nd St., Cincinnati, Ohio, is now marketing a rotary table especially designed for heavy duty work on horizontal boring mills, large milling machines, die sinkers, slotters, and similar machines. The platen revolves on a full diameter track and



Troyke Rotary Table

the platen may be held down on the track in any stationary position by the use of three clamps which are built into the table. The worm may be disengaged to permit movement of the platen by hand.

Adjustment is provided to take up wear between the wheel and worm and to take up wear in any moving part. The platen is over 50 per cent steel nickel iron. The worm wheel is bolted and dowled to the plate and is replaceable. Centralized oiling provides lubrication to all moving parts.

Known by the model numbers BH-21

PRECISION
Gears

ANY MATERIAL

30 YEARS EXPERIENCE

DETROIT BEVEL GEAR CO.

8130 Jos. Campau Ave., Detroit, Michigan



Another NEW FEATURE

Built Into Universal's Efficient Collet Chucks

In addition to ground threads which assure concentricity and a handy wrench grip for ease in handling Universal Collet Chucks are now equipped with an automatic release spring which, as the nut is loosened forces the collet forward, automatically releasing the grip on the tool.

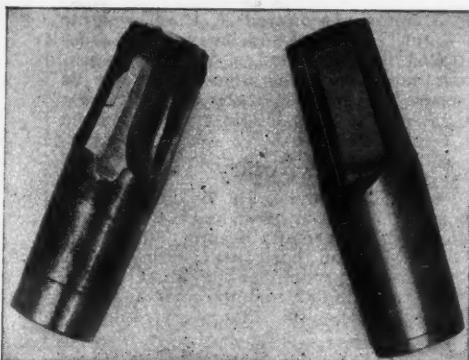
UNIVERSAL
Engineering Company
Frankenmuth, Mich.

and BH-25, the rotary table can be supplied with a turntable of 21 or 25-in. diameter, 7 or 7½ in. in height overall, and to weigh 400 or 525 lbs. The platen is graduated in degrees and the dial is graduated in minutes. The pointer is adjustable.

"Super Tool" Carbide-Tipped Tool Salvage Service

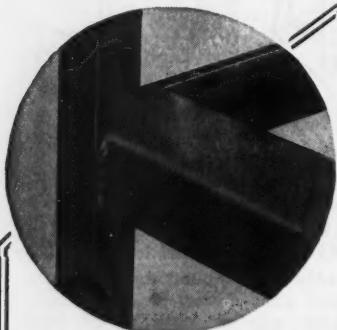
In view of the wide use of tungsten carbide-tipped tools in industry, the announcement of the Super Tool Company, P. O. Box 68, Harper Station, Detroit, Mich., of the inauguration of a carbide tool salvage division is timely. This service is applied to cutter blades, boring tools, drills, lathe centers, reamers, end mills, turning tools, broaches, and all other cutting tools in which tungsten carbide is used for tipping the cutting edges.

The service consists in repairing shanks that are in good condition and



Carbide-tipped tools that have been reconditioned, giving them new tool efficiency at an economical cost.

retipping the cutters with new carbide metal, remounting usable tips or parts of tips on new shanks, reconditioning broken or damaged tools, gages, or cutters to make them like new, grinding tools and gages to the owner's specifications, altering obsolete tools so that



They're Welded... “HALLOWELL” STEEL STOOLS

stay firm and rigid and
last far longer

"Hallowell" Stools and Chairs give maximum value for every cent you spend, for they have the all welded construction that makes them practically one piece. There's no weak riveted joints to loosen up...no chance for them to get rickety and wobbly after a little service. Replacement costs are cut...and more comfortable, more efficient seating for your employees is provided.

A complete range of styles to fill every requirement.
Get our catalog.



Fig. 1249
Pat. Applied For

STANDARD PRESSED STEEL Co.

BRANCHES

BOSTON

DETROIT

INDIANAPOLIS

JENKINTOWN, PENNA.

BOX 556

BRANCHES

CHICAGO

ST. LOUIS

SAN FRANCISCO

they can be made to serve on other jobs thus reducing tool inventory as well as economizing on new tool purchases, and diamond wheel grinding and diamond lapping of all sorts of carbide tools and gages. The carbide-tipped blades on reamers, burnishers, or other tools can be expanded to bring them up to size and back to new tool efficiency.

"Special X" Liquid Soldering Flux

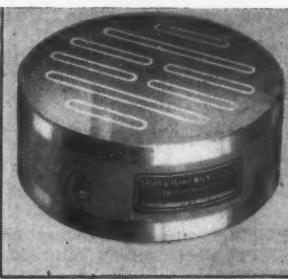
A liquid soldering flux intended for use on brass, copper, cadmium, stainless steel, zinc, monel, iron, and many other alloys, is now being marketed by Industrial Service Laboratories, 915 W. Oklahoma Ave., Milwaukee, Wis., under the trade name of "Special X." This liquid soldering flux is claimed to work unusually well in production or "line" soldering of toys, expansion valves, electrical controls, small pressure tanks, restaurant equipment, milk coolers, lighting fixtures, and so on. Lowered surface tension and high wetting power of the flux are said to cause quick and uniform flow of solder into all cracks and crevices.

GE Low-Speed Synchronous Motors having ratings from 20 h.p. at 257 r.p.m. to 225 h.p. at 450 r.p.m. are described and illustrated in a four-page bulletin released by the General Electric Co., Schenectady, N. Y. Copy of Bulletin GEA-137D free upon request.

Acme 3S and 1S Heavy Duty Universal Turret Lathes

In the description of the new universal turret lathes now being built by The Acme Machine Tool Company, Cincinnati, Ohio, which was included on page 167 of the September issue of this magazine, the machines were mentioned as the No. 35 Universal Turret Lathe and the No. 15 Universal Heavy Duty Turret Lathe. This was an error; the lathes are known as the No. 3S and No. 1S Heavy Duty Universal Turret Lathes.

2 Models
—
4 Sizes



... Rotary — Working Face, 9" dia.
Rectangular — 5" x 10" 6" x 18" 8" x 24"

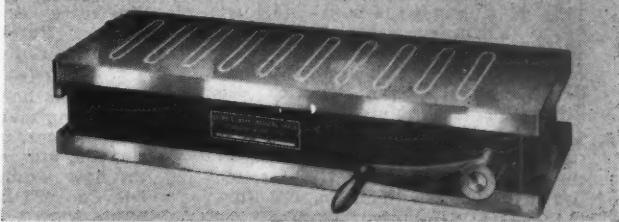
BROWN & SHARPE
MAGNETIC CHUCKS
Permanent Magnet Type

No Wires—No Heating—No Running Costs



Ask for Circular —

Brown & Sharpe Mfg. Co.
Providence, R. I., U. S. A.





FOR YOUR CATALOG LIBRARY

*To obtain copies of the catalogs listed here,
indicate on the coupon the number of the item
in which you are interested and mail as directed.*

1. Vertical Turret Lathe

A new 24-page catalog has just been published by The Bullard Co., Bridgeport, Conn., which illustrates and describes the Bullard Spiral Drive Type Vertical Turret Lathe.

2. Motor Lubrication

A new three-color bulletin describing U. S. Lubriflush system of motor lubrication has just been issued by U. S. Electrical Motors Inc., Los Angeles, Cal.

3. Machining Zinc Alloy Die Castings

The New Jersey Zinc Co., 160 Front St., New York, N. Y., has released a new booklet titled "Practice in Machining Zinc Alloy Die Castings."

4. Wire Feed Screw Machines

An elaborate 32-page catalog detailing Wire Feed Screw Machines has been issued by Brown & Sharpe Mfg. Co., Providence, R. I.

5. Taps

A handsome 140-page catalog featuring taps, gages, rolling dies, tap maintenance equipment, threading tools, etc., has just been released by Detroit Tap and Tool Co., Detroit, Michigan.

6. Threading Machines

Landis Machine Co., Inc., Waynesboro, Pa., has available Bulletin No. H-75-4 featuring Landmaco Threading Machines.

7. Stainless Steel Stock List

This is a handy 16-page Stocklist SS100 showing size of Rezistal sheets, bars and welding rods carried in Crucible's Mills and Branches. Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.

8. Ball and Roller Bearings

Catalog No. 16 details in 16 pages the Gwilliam line of ball and roller bearings. The Gwilliam Co., 360 Furman Street, Brooklyn, N. Y.

9. Horizontal Broaching Machines

Oilgear Fluid Power, Variable Speed Horizontal Broaching Machines are illustrated and described in new Bulletin 20000. The Oilgear Co., 1320 A West Bruce St., Milwaukee, Wis.

10. Expansion Laps

Bulletin detailing copper head expansion laps is available from Boyar-Schultz Corp., 2120 Walnut St., Chicago, Illinois.

11. Welding Timers

Weltronic Automatic Welding Timers are detailed in complete catalog issued by Weltronic Corporation, 2832 E. Grand Blvd., Detroit, Mich.

12. Boring Bar

Everede Tool Co., 180 N. Wacker Drive, Chicago, Ill., has issued a folder describing the Everede Boring Bar with triangular bit.

13. Files

Five thousand different files are described in Catalog KNA issued by Grobet File Corp. of America, 3 Park Place, New York, N. Y.

14. Collet Chucks

A new bulletin featuring Universal Collet Chucks has been released by Universal Engineering Co., Frankenmuth, Michigan.

15. Rotating Shelving

A 4-page folder issued by The Frick-Gallagher Mfg. Co., Wellston, Ohio, illustrates and describes various types of Rotabin storage equipment for industrial plants.

16. 4-Speed Drive

Details on the Schultes 4-Speed Drive for milling machines, shapers, lathes, drill presses, planers, punch presses, slotters, etc., are contained in bulletin now available. Westlof Tool & Die Co., 430 Bellevue Ave., Detroit, Michigan.

- 17. Automatic Saw Sharpener**
 Details on the Wardwell No. 35T Sharpener for automatically sharpening metal saws in gangs are available from The Wardwell Mfg. Co., 3166 Fulton Road, Cleveland, Ohio.
- 18. Hitch Feed**
 Folder No. 84 illustrates and describes the Dickerman Hitch Feed which is adaptable to any ordinary punch press without press alterations. H. E. Dickerman Mfg. Co., 284 Wilbraham Road, Springfield, Massachusetts.
- 19. Factory Equipment**
 The Cleveland Wire Spring Co., Cleveland, Ohio, has available new Catalog No. 33, featuring Steel Shop Boxes, shop kegs and pails, annealing pans, drying pans, lathe pans, waste cans, stools, steel tool and supply racks, shelving, coiled wire and flat springs and formed wire specialties.
- 20. New Sine Angle Plate**
 The New Kar Sine Angle Plate which incorporates improvements over earlier models, is detailed in a new bulletin. The Kar Engineering Co., Inc., 200 Hudson St., New York, N. Y.
- 21. Roller Chain Catalog**
 The Baldwin - Duckworth Chain Corp., Springfield, Mass., has just issued Catalog M, which lists and describes the company's complete line of single and multiple strand roller chains, sprockets and specialties. Other items are also featured.
- 22. Surface Grinding Machine**
 Circular D-B-2 illustrates and describes the Walker Single Stroke Surface Grinding Machine, Model D-B. O. S. Walker Co., Inc., Worcester, Massachusetts.
- 23. Shim Application Chart**
 This new chart, just released, contains a comprehensive survey of proved applications for laminated shims and shim stock. Laminated Shim Company, Inc., 21-86 Forty-fourth Ave., Long Island City, New York, N. Y.
- 24. Woodruff Type Keys and Cutters**
 Catalog V-111, issued by The Whitney Chain and Mfg. Co., Hartford, Conn., completely details Whitney Woodruff Type Keys and Cutters.
- 25. Coated Abrasive Papers and Cloths**
 A useful catalog and price list chuck full of useful information on coated abrasive papers and cloths has just been issued by Abrasive Products, Inc., South Braintree, Mass.

Print plainly in filling out coupon for literature.

MODERN MACHINE SHOP
431 Main St., Cincinnati, Ohio

I am interested in receiving the following literature reviewed in your October issue.

No. No. No. No.
(Insert numbers denoting literature you want.)

Name Title

Company

Company Address

City State

SERVICES DIRECTORY

GRINDING • STAMPINGS • TOOL and DIE WORK
MACHINE WORK • CASTINGS • HEAT-TREATING
FORGINGS • EMPLOYMENT • BUSINESS • ETC.

**FOR BEST RESULTS
AT LOWEST COST
ADVERTISE**
Your Service in
**THE SERVICES
DIRECTORY
of
Modern Machine Shop**
Rates on Request

DESIGNING AND MANUFACTURING OF METAL SPECIALTIES

Stamping, Machining, Model Making, Spot Welding, Special Order Production in Large or Small Runs, Electrical Specialties.

GERDING BROTHERS

Third and Vine Sts. Cincinnati, Ohio

Centerless Grinding

(CONTRACT WORK)
Precision, Accuracy, Promptness
Let us quote on your specifications.

THE HEIM COMPANY
Fairfield * Connecticut

DIES, JIGS AND FIXTURES

Large or Small Designed and Built. Commercial Jig Boring at reasonable prices. Prompt service. Let us quote.

QUALITY TOOL & DIE CO.
403 N. Noble St. Indianapolis, Ind.
RAY W. RICE, Mgr.

CENTERLESS GRINDING

Straight—Tapered—Double Diameter
Shoulder and Profile Diameter
Internal Grinding—External Grinding
Taper and Straight Dowel Pins Made to Order
Screw Machine Products Heat-Treated
Before Grinding If Necessary
Industrial Centerless Grinding Co.
14640 Schaefer Road Detroit, Mich.

QUOTATIONS INVITED

For Manufacturing of Light Machinery.
6,000 Sq. Ft. Floor Space, Well Equipped.

NORTH END MACHINE COMPANY
Established 1928 BARBERTON, OHIO

GRIND THE EASTERN CENTERLESS WAY

Accuracy—Fine Finishes—Low Cost
Large or Small Lots

EASTERN CENTERLESS GRINDING CO.
628 Capitol Ave. • Hartford, Conn.

AUTOMATIC AND HAND SCREW MACHINE PRODUCTS

...up to 2 $\frac{1}{4}$ " diameter—any material—
small or large quantities. Prompt service.

IMSANDE SCREW PRODUCTS CO.
3917 CARDIFF AVE., OAKLEY, CINCINNATI, O.

CENTERLESS GRINDING

Since 1925
**CINCINNATI
ICE PICK & TONG MFG. CO.**
118 BURROWS ST. • CINCINNATI, O.

CENTERLESS GRINDING



Straight—Cylindrical
Shoulder—Profile
and Double Diameters

All Kinds of Materials

SCREW MACHINE PRODUCTS

Heat Treated and Ground If Necessary

Improved and expanded facilities
insure prompt and accurate service.

Send blueprints or samples for estimates.

PORTER MACHINE CO.

3120 FORRER AVE. CINCINNATI, OHIO

PRECISION GROUND GEARS CAMS THREADS SPLINES

Excellent facilities for grinding gears, cams, threads and splines on a contract basis.

SEND BLUEPRINTS FOR ESTIMATE.

HARTFORD SPECIAL MACHINERY COMPANY

Hartford, Conn.

PATTERNS

Wood and Metal—also Match Plates.
For all kinds of castings—large or small.

Estimates on Request.

GENERAL PATTERN WORKS
2231 Buck St. North of Harrison Ave.
Cincinnati, Ohio Phone MAIN 4751

Fluorescent Mazda Lamps. A 16-page bulletin of engineering data covering fluorescent lamp operating information, lamp performance factors, auxiliaries, operating characteristics, color quality, and application considerations is now available from Nela Park Engineering Department, General Electric Company, Nela Park, Cleveland, Ohio. Copy free upon request.

DIE CASTINGS

PARKER

SINCE ERIE 1906

Zinc Base Die Castings

PARKER WHITE-METAL AND MACHINE CO.

ERIE, PA.

DIE CASTINGS



... where modern equipment and efficient methods are the order of the day."

Send your BLUE PRINTS or SAMPLES for ESTIMATES
MOUNT VERNON DIE CASTING CORP
MOUNT VERNON

STAMPINGS IN SMALL LOTS

Special: Total die and stamping cost for 1,000 flat blanks most any shape up to 10 sq. in. \$25.00

We can save you money on all types of sheet metal parts in small quantities.

All types of dies designed and built.

SOUTHERN PRODUCTS

DEPT. M10 INDEPENDENCE, MO.

Stainless Steel Stock List. Crucible Steel Company of America, 405 Lexington Ave., New York, N. Y., is now issuing a handy 16-page stock list, designated as SS100, which presents the sizes of Rezistal sheets, bars, and welding rods carried in stock by Crucible's mills and branches. Copy free to any mechanical executive upon request.

BOARD OF STRATEGY

NOW THAT THE WORLD SERIES IS OVER, THE GRAND-STAND MANAGERS ARE GOING TO SHOW 'EM HOW TO RUN THE WAR!

YES, AND IF THEY DON'T GET OUT OF EUROPE AND BACK TO WORK BEFORE THE BOSS COMES, THERE'S GOING TO BE A WAR RIGHT HERE!

NOW WHAT THEY SHOULD'A DONE WAS TO GO IN RIGHT FROM THIS POINT LIKE OUR REGIMENT DID IN 1918. WE SURE SETTLED THINGS IN A HURRY!

WHAT DO YOU KNOW ABOUT IT? YOUR BUDDIES TOLD ME YOU DIDN'T GET TO FRANCE UNTIL AFTER THE ARMISTICE WAS SIGNED!

BET YOU TWO TO ONE THAT THEY THINK THE MAGINOT LINE IS WHERE THE FRENCH HANG UP THEIR WASHING!

Burt Wasson

Chromium Plated Gage Blocks, a product of the Dearborn Gage Co., 22035 Beech St., Dearborn, Mich., are discussed in a 12-page booklet now being distributed by this firm. A description of chromium plated gage block sets produced in the Dearborn plant together with a price list of new and reconditioned gage blocks are given. Individual gage block prices are also included in the booklet, copy of which will be sent free upon request.

CP Class O-CTE Horizontal Tandem Duplex Motor-Driven Compressors are the subject of Supplement B, Bulletin No. 726, published by Chicago Pneumatic Tool Company, 6 E. 44th St., New York, N. Y. The details of construction are described with the aid of a labeled sectional view of a compressor. Installation photographs show the compressors in use in a mine, a foundry, and a manufacturing plant. Copy free upon request.

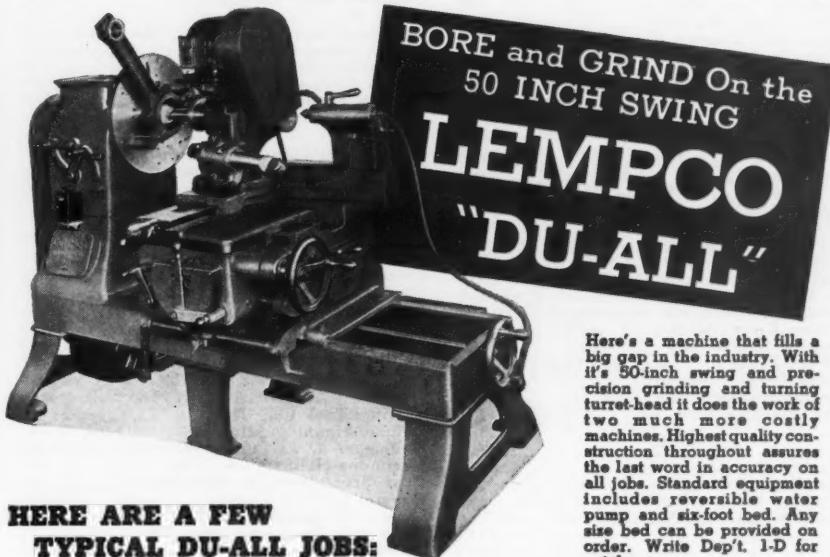
Kennametal Speed Chart. A convenient lathe chart giving the recommended speeds for cutting steels of any range of hardness with Kennametal carbide tool bit tip material has been prepared for distribution by the McKenna Metals Co., 300 Lloyd Ave., Latrobe, Pa. Cutting speeds recommended on the chart range from 20 to 30 surface ft. per min. for work of 65 Rockwell C (682 Brinell) to 300 to 400 surface ft. per min. for work of 25 Rockwell C (249 Brinell). For work of lower hardness any speed above 250 surface ft. per min. is recommended.

The chart also illustrates two designs

for grinding tools so as to produce (1) crescent shaped chips, which are easily shoveled up, and (2) a coiled chip of tough steel. The reverse side illustrates the correct tool shape for interrupted (jump cuts) with Kennametal tools; also, the terms used in describing angles on single point cutting tools.

Printed in black ink on yellow stock, the chart is extremely legible and is varnished on both sides for easy cleaning. It is furnished with a hole punched at the top so that it can be hung on a lathe. The chart will be sent to any machinist or machine shop executive free upon request.

CUT PRODUCTION COSTS!



Here's a machine that fills a big gap in the industry. With its 50-inch swing and precision grinding and turning turret-head it does the work of two much more costly machines. Highest quality construction throughout assures the last word in accuracy on all jobs. Standard equipment includes reversible water pump and six-foot bed. Any size bed can be provided on order. Write Dep't. 1-D for catalog.

General Internal Grinding . . . Surface and Face Grinding . . .
General External Grinding . . . Large and Small Connecting
Rods . . . Turning . . . Boring . . . Surface and Face Turning
. . . Forming Dies . . . Deep Drawing Dies . . . Blanking Dies.

MAKE US PROVE IT—SEND FOR CATALOG (*A few territories still open for dealers.*)

LEMPCO PRODUCTS, INC., Bedford, O.



I EX TO ADVERTISEMENTS

A

Abrasive Machine Tool Co., The.....	126
Acme Industrial Company.....	179
Acme Machine Tool Co., The.....	102
Alco Tool Co., The.....	151
American Air Filter Co.....	18
American Saw & Mfg. Company.....	82
American Swiss File & Tool Co.....	169
American Tool Works Company, The.....	56
Anderson Bros. Mfg. Co.....	162
Arguto Oilless Bearing Co.....	172
Armstrong-Blum Mfg. Co.....	99
Armstrong Bros. Tool Co.....	42
Atlantic Gear Works.....	200
Auburn Ball Bearing Co.....	175
Automatic Gas Steam Radiator Co.....	185
Auto Moulding & Mfg. Co.....	169

B

Barber-Colman Company.....	24
Barnes Co. Inc., W. O.....	75
Bath & Co., Inc., John.....	149
Baumbach Mfg. Co., E. A.....	169
Bay State Abrasive Products Co.....	20
Bergram Mechanical Engineering Co., Inc.....	187
Besly & Co., Charles H.....	30
Bissell Steel Company, The.....	155
Boyar-Schultz Corporation.....	176
Boye & Emmes Machine Tool Co., The.....	156
Bremil Manufacturing Company.....	174
Brickner-Kropf Machine Company.....	152
Brown & Sharpe Mfg. Co.....	191
Buckeye Brass and Manufacturing Co.....	103
Buffalo Forge Company.....	29
Bullard Company, The.....	9
Burke Machine Tool Co.....	132

C

Carboloy Company, Inc.....	4
Carborundum Company, The.....	143
Carpenter Steel Co., The.....	161
Carroll & Jamieson Machine Tool Co., The.....	132
Cerro de Pasco Copper Corp.....	153
Chicago Pneumatic Tool Company.....	61
Chicago Wheel & Mfg. Company.....	163
Cincinnati Ball Crank Co., The.....	165
Cincinnati Bickford Tool Co., The.....	51
Cincinnati Electrical Tool Co.....	123
Cincinnati Gear Company, The.....	178
Cincinnati Milling Machine Co., The.....	6, 7
Cincinnati Planer Co., The.....	41
Cincinnati Shaper Co., The.....	53
Circular Tool Company, Inc.....	171
Cleveland Tool Engineering Co., The.....	80
Cleveland Twist Drill Co.....	69
Cleveland Wire Spring Co., The.....	187
Climax Molybdenum Company.....	119
Columbus-McKinnon Chain Corp.....	147
Commercial Centerless Grinding Co.....	182

Conco Engineering Works.....	162
Crafts Company, Inc., Arthur A.....	153
Crucible Steel Co. of America.....	63
Cullman Wheel Company.....	167
Cushman Chuck Company.....	145

D

Danly Machine Specialties, Inc.....	186
Davis Boring Tool Co.....	38
Davis Keyseater Company.....	167
Dayton Tool & Engineering Co., The.....	137
Dearborn, J. W.....	179
Dearborn Gage Company.....	148
Delta Mfg. Co.....	57
Desmond-Stephan Mfg. Co., The.....	166
Detroit Bevel Gear Co.....	189
Dickerman Mfg. Co., H. E.....	78
Draffo Company, The.....	184
Dreis & Krump Mfg. Co.....	157

E

Eastern Machine Screw Corp.....	170
Edgemont Machine Company.....	160
Ettco Tool Co. Inc.....	139

F

Farrel-Birmingham Company, Inc.....	21
Fellowes Gear Shaper Company, The.....	11
Foote-Burt Company, The.....	36
Ford Mfg. Co., M. A.....	116
Formica Insulation Co., The.....	131
Fosdick Machine Tool Co., The.....	19
Frick-Gallagher Mfg. Co., The.....	177
Fulflo Specialties Company, Inc., The.....	127

G

Gairing Tool Co., The.....	12
Galland-Henning Mfg. Co.....	141
Gallmeyer & Livingston Co.....	76
Gammons-Holman Co., The.....	163
Gear Specialties Incorporated.....	183
General Electric Company.....	10, 65
General Engineering & Mfg. Co.....	157
Geometric Tool Company, The.....	34
Gerstner & Sons, H.....	182
Gisholt Machine Company.....	15
Graham Mfg. Company, Inc., The.....	174
Grant Mfg. & Machine Co., The.....	98
Gray Machine Co.....	176
Greenfield Tap & Die Corporation.....	
Grobet File Corp. of America.....	107, 154
Gwilliam Company, The.....	153

Third Cover

Hannifin Manufacturing Company.....	97
Haskins Company, R. G.....	17
Hassall, Inc., John.....	167
Heald Machine Company.....	49
Hjorth Lathe & Tool Company.....	164
Holo-Krome Screw Corp., The.....	87

J

J. & H. Electric Co.	155
Jacobs Manufacturing Company, The	129
Janette Manufacturing Company	187
Jarvis Co., The Charles L.	158, 159
Johnson Bronze Company	40

K

Kar Engineering Co., Inc., The	32
--------------------------------	----

L

L-W Chuck Company	134
Laminated Shim Company, Inc.	111
Landis Machine Co., Inc.	2
Lee & Son Co., K. O.	185
Leiman Bros. Inc.	104
Lempco Products, Inc.	157, 197
Lincoln Electric Company, The	93
Logansport Machine, Inc.	Second Cover
Lucas & Son, Inc., J. L.	184
Lufkin Rule Co., The	67
Lyon Metal Products, Incorporated	168

M

McCrosky Tool Corp.	31
McKenna Metals Company	181
Maplewood Machinery Company	168
Marburg Brothers, Inc.	200
Marquette Mfg. Co.	128
Metzgar Company	174
Michigan Chrome Company	178
Millers Falls Company	28
Modern Machine Shop	166
Modern Tool Works	3
Monarch Machine Tool Co., The	25
Morse Twist Drill and Machine Co.	8
Mummert-Dixon Company	166
Murchey Machine & Tool Co.	130

N

National Automatic Tool Co., The	105
National Twist Drill & Tool Co.	113
New Departure Mfg. Co.	Fourth Cover
New Method Steel Stamps, Inc.	171
Nicholson File Company	81
Nielsen Tool & Die Co.	188
Norma-Hoffmann Bearings Corp.	First Cover
Norton Company	100, 101
Numberall Stamp & Tool Co., Inc.	173

O

Oliver Instrument Company	39
---------------------------	----

P

Parker-Kalon Corporation	22
Pittsburgh Stamp Company, Inc.	161
Procurier Safety Chuck Co.	150
Production Equipment Co., The	155
Production Machine Company	88
Progressive Tool & Cutter Co.	175
Pyrometer Instrument Co., The	184

R

Remco Products Corp.	146
Rivett Lathe & Grinder Inc.	91
Rockford Machine Tool Co.	33
Rogers Mfg. Co., Dayton	170
Russell Electric Company	186
Ruthman Machinery Co., The	179

S & S Machine Works	170
Savage Company, W. J.	177
Schauer Machine Co.	177
Scherr Company, Inc., George	200
Schmidt, Inc., George T.	106, 168
Seneca Falls Machine Co.	23
Services Directory	194, 195
Severance Tool Mfg. Co.	182
Shakeproof Lock Washer Company	26, 27
Sheldon Machine Co., Inc.	122
Simonds Saw and Steel Co.	89
Smith & Mills Co.	126
South Bend Lathe Works	16
Stackbin Corporation	181
Standard Pressed Steel Co.	171, 173, 190
Stanley Works, The	121
Staples Tool & Engineering Co., The	180
Star Machine & Engineering Corp.	138
Starrett Company, The L. S.	77
Stow Mfg. Co., Inc.	135
Sturdimatic Tool Company	186
Super Tool Company	188
Sutton Tool Company	183

T

Tanneowitz Works, The	187
Texas Company, The	13
Tide Water Associated Oil Co.	108, 109
Timken Roller Bearing Company, The	1
Titan Tool Company	180
Tomkins-Johnson Company, The	83
Trico Fuse Mfg. Co.	188
Triplex Machine Tool Corp.	176
Twin Disc Clutch Company	79

U

Union Drawn Steel Company	117
Union Twist Drill Co., Butterfield Div.	185
United States Drill Head Co.	160
Universal Engineering Company	140, 189

V

V & O Press Company	178
Victor Machinery Exchange, Inc.	165
Vimco Manufacturing Company	183
Vincent Steel Process Co., The	142

W

Walker Co., Inc., O. S.	133
Walls Sales Corporation	173
Waltham Machine Works	165
Walton Company, The	164
Wardwell Mfg. Co.	144
Warner & Swasey Co.	55
Watts Bros. Tool Works	180
Wesson Company	175
Westinghouse Electric & Mfg. Co.	70, 71
Westlof Tool & Die Co.	124
Wheel Trueing Tool Co., Inc.	163
Whitney Chain & Manufacturing Co.	161
Whitney Metal Tool Company	181
Williams & Co., J. H.	37
Wilson Mechanical Instrument Co.	84, 85
Wilson Welder and Metals Co., Inc.	125
Winter Bros. Co.	14

Y

Yale & Towne Mfg. Co., The	35
----------------------------	----

ATLANTIC GEARS ARE SPECIFIED



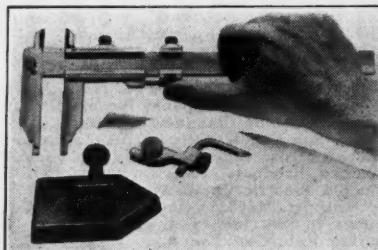
In hundreds of shops. Complete stock of standard gears carried in New York for immediate delivery. Also speed reducers, sprockets, thrust bearings, flexible

couplings. We provide gears for some of America's best known equipment. Rapid service on special gears. Send blue-prints for prompt quotation. We specialize in rush jobs.

Write for catalog No. M-39.

ATLANTIC GEAR WORKS
202 Lafayette St. • New York, N. Y.

VERNIER CALIPERS CONVERTIBLE TO HEIGHT GAGES

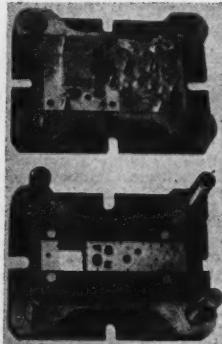


Mauser Combination Height Gage and Vernier Caliper No. 613R measures to $\frac{7}{8}$ " in $1/1000"$ and $1/128"$. Accuracy guaranteed. Measuring surfaces glass-hard. Price \$19.25. Also available in other models from 6" to 12". Tools obtainable with both millimeter and inch graduations reading in $1/50$ mm and $1/1000"$. Order on ten days' trial or write for complete 15-page catalog.

Geo. Scherr Co. 130 Lafayette St.
New York, N. Y.

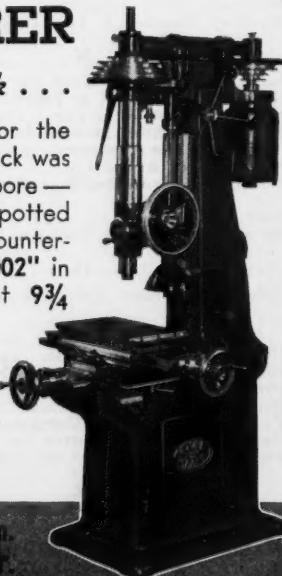
THE MOORE JIG BORER

on Precision Die Work . . .



This progressive Die for the Frame of a well-known Clock was completely done on a Moore—**44 Holes** were Located—Spotted—Drilled—Bored—Counter-bored and Reamed to $.0002"$ in the Record Time of but $9\frac{3}{4}$ Hours.

See the Moore demonstrated at the Metal Show in Chicago, Int'l. Amphitheatre, Booth 323, October 23 to 27.



Built by: The Moore Special Tool Co., Bridgeport, Conn.

MARBURG BROS. 80-90 WEST ST., NEW YORK



V
a
is
re
G

W

In
Ta
Ca



Trained Engineering Skill Comes with these Tools

TAPS: High speed, ground thread
"Maxi" finish, all sizes, all types.
DIES: "Acorn" Dies for high pro-
duction. Round Dies for miscellaneous
work.

GAGES: All kinds of plug and ring
and limit snap gages, for gaging plain
and threaded surfaces.

Who is this Man?

"Salesman" some might call him—"Sales Engineer" is better. To you, he's probably just "the GREENFIELD man." Perhaps you know him so well you can name him—for this actual photograph could have been taken in any one of hundreds of the country's leading plants.

He is one of 30 odd men who know G. T. D. Greenfield tools so well, and know so many ways of getting the most out of them that they are in customers' plants day after day. Their job is to see that customers get the highest possible returns from their investment in G. T. D. Greenfield tools.

GREENFIELD TAP & DIE CORPORATION Greenfield, Massachusetts

Detroit Plant, 2102 West Fort St.
Warehouses in New York, Chicago, Los Angeles and San
Francisco

In Canada: Greenfield
Tap & Die Corp., of
Canada, Ltd., Galt, Ont.

GREENFIELD



CONTROLLED PRECISION

from FORGED rings to

finished bearing

Forged for exact *control* of shape and grain flow; for maximum strength and resistance to wear — manufactured with completely *controlled* precision at every step, New Departure Ball Bearings are used by builders everywhere, to make fine machine accuracy permanent.

New Departure, Division of General Motors, Bristol, Connecticut.



NEW DEPARTURE

THE FORGED PRECISION BEARING

